OBSERVATIONS

ON THE

NATURE AND CONSEQUENCES

OF

WOUNDS AND CONTUSIONS

OF THE

HEAD,

FRACTURES OF THE SKULL,

CONCUSSIONS OF THE BRAIN, &c.

BY

PERCIVALL POTT,

SURGEON to St. BARTHOLOMEW's Hoſpital.

Nullum capitis vulnus contemnendum. HIPPOCRATES.

Nam veluti magna et gravia capitis vulnera non ſemper ſequitur mors, ſic et levia ſæpenumero mortis cauſæ ſunt.

GALEN.

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TO THE

PRESIDENT, TREASURER,

and GOVERNORS

Of St. *Bartholomew's Hoſpital.*

GENTLEMEN,

THE execution of that office, with which I have, by your favour, been ſeveral years intruſted, has enabled me to make many chirurgical obſervations.

THE following pages, which contain a few of them, are publiſhed with a ſincere deſire of being beneficial to

mankind, by giving ſome little information to thoſe of my brethren, who have not had the ſame opportunity.

If they ſhould in any degree anſwer that end, they will prove, that the benefits ariſing from a public Hoſpital, are by no means confined to the poor therein received, but are capable of being extended to all ranks and degrees of men: and that theſe houſes, in which ſurgery, an art ſo generally neceſſary, and ſo extenſively beneficial, is taught, have a natural, and juſt claim, to the protection

and

and patronage of all thoſe who, either by their ſituation or circumſtances, are enabled to relieve the various diſtreſſes of their fellow-creatures.

To you, GENTLEMEN, who are the Guardians of that particular hoſpital, to which I have the honour to belong, theſe ſheets are addreſſed, in teſtimony of that reſpect, with which

I am,

GENTLEMEN,

Your moſt obedient,

Humble Servant,

Watling-ſtreet,
1759.

PERCIVALL POTT.

PREFACE.

IN the preface to a Treatiſe on the Fiſtula Lachrymalis, I took the liberty of ſaying, I had obſerved that many of thoſe gentlemen who come hither to finiſh their chirurgical education, were too apt to fix their attention on the operative part of ſurgery only.

THIS did then, and does ſtill, appear to me to be a truth of no ſmall conſequence.

DEXTERITY in operating is certainly one qualification of a ſur-

geon, but it is only one; many others are equally neceſſary. The preſervation of any part of the human frame has, at leaſt, as much merit, as the moſt dextrous manner of removing it: and there are many diſorders ſtrictly within the ſurgeon's province, the management of which will require more real ſkill, and judgment, than are neceſſary for the mere performance of any operation whatever; not to add, that the power and capacity of a practitioner are full as often ſhewn by preventing an operation, as in performing it.

NEITHER is this faculty of dexterity confined (as is moſt abſurdly ſuppoſed) to capital operations only; every

every part of the art will furniſh manifold proofs to the contrary: every part of it requires a hand accuſtomed to execute, as well as a head capable of directing. The different manner in which fractured limbs may be diſpoſed, diſlocated joints replaced, and many chirurgical diſorders treated, will not only ſhew the abilities of the ſurgeon, but will produce an almoſt inconceivable difference to the patient, as well in his preſent ſenſations, as in the future conſequence of his complaint. Pain is a real evil to him that feels it; lameneſs, and deformity, are ſometimes the inevitable conſequence of diſeaſe, but they are alſo ſometimes produced by inattention and aukwardneſs.

I SHOULD be very ſorry to have it thought that I meant to diſſuade the ſtudents of ſurgery from endeavouring to become good operators. This is far from my intention; I know the neceſſity and importance of it, and only mean to diſſuade them from making it their ſole object.

JUDGMENT in diſtinguiſhing, and ability in treating diſeaſes, are not to be attained by a tranſient curſory view of them; merely running round an Hoſpital for a few months, or reading a general ſyſtem of ſurgery, will not form a compleat practitioner: the man, who aims at that character, muſt take notice of many little things, which

the inattentive paſs over, and which cannot be remarked by writers; he muſt accuſtom himſelf to ſee, and to think for himſelf; and muſt regard the rules laid down by authors, as the outlines only of a piece, which he is to fill up and finiſh: books may give him general ideas, but practice, and meditation, muſt make him adroit and diſcerning; without theſe, his reading may poſſibly keep him clear of very groſs blunders, but he will ſtill remain injudicious, and inexpert.

The great variety of habits, and conſtitutions; the frequent complications of diſeaſes with each other; and the ſtrange effects of external violence, make a large field of con-

contemplation; but he who runs haſtily thro' it, will be but little acquainted with it, and will often fall into errors, diſgraceful to himſelf, and pernicious to others.

SURGERY is founded on obſervation, and ſupported by experience; it not only requires a good deal of time to become well acquainted with it in general, but even the moſt judicious, and beſt experienced, ſometimes find themſelves under a neceſſity of changing their opinions, and altering their conduct: what was ſaid by an extreme good judge of man, will be found equally juſt and true in arts as in ethics[a], eſpecially ſuch an art as ours,

[a] Nunquam ita quiſquam bene ſubducta ratione ad vitam fuit, quin res, ætas, uſus, ſemper aliquid aportet novi,

ours, which depends upon reiterated experiment, and whoſe ſubject is liable to ſo much variation.

LORD Bacon adviſes a ſtudent to conſider one part, and one diſeaſe at a time, and to become thoroughly acquainted with that before he undertakes another.

PERHAPS a ſtrict, literal adherence to this rule, would render the ſtudy of medicine too tedious to be accompliſhed in any reaſonable time; but under certain limitations the advice will be found uſeful.

THE compilers of ſyſtems, or inſtitutes, cannot poſſibly conſider diſ-

novi, aliquid moneat; ut illa, quæ te ſcire credas neſcias, et, quæ tibi putaris prima, in experiundo ut repudies. TERENT. Adelph.

diſeaſes with that accuracy and minuteneſs, which many of them require; and opinions formed from ſuch general accounts only, muſt often be very ſuperficial.

The writer who confines himſelf to one ſubject at a time, may, without incurring the charge of prolixity, deſcend to many little particulars, both in practice and theory, which are extremely neceſſary to be known, but which would ſwell a general ſyſtem into an immoderate ſize. He does not lie under the neceſſity of treating his ſubject with ſuch brevity; and therefore it is his own fault if he is not explicit.

THIS has always been my opinion; and in conſequence thereof, I have already ventured to ſubmit my thoughts on one or two diſeaſes to the public. The favourable reception they have met with, has emboldened me to publiſh the following practical remarks on another; which, perhaps, has neither been ſo carefully attended to, nor ſo thoroughly explained, as the great importance of the ſubject requires; and which is accompanied with more uncertainty, creates more anxiety to the ſurgeon, and more hazard to the patient, than almoſt any other ill, to which the human frame is liable from external violence: I mean, wounds of the head.

THIS is a general term, under which have always been comprehended ſeveral different diſorders, produced by various immediate cauſes, and affecting different parts. All injuries done by outward violence to the ſcalp, pericranium, ſkull, membranes of the brain, or to the brain itſelf; either by cut, laceration, or bruiſe of the integuments; by wound, contuſion, or fracture of the cranium; by wound of the brain, or its membranes; or by the preſſure of fluid, extravaſated in conſequence of injury from without.

SOME of theſe ills are viſible, and therefore known immediately; others have often no external mark,

and therefore can be judged of, only by the diſorders which they produce.

If theſe caſes were always ſimple, and uncombined, the particular kind of miſchief would, in general, be indicated by its particular ſymptoms; but unfortunately this does not often happen; great violences offered to the head, ſeldom produce one ſimple effect on one part only; and when different ſymptoms, proceeding from various miſchief, are blended together, it becomes extremely difficult, not to ſay impoſſible, to diſtinguiſh the immediate cauſes from each other, however important ſuch diſtinction would be in practice.

This alone will neceſſarily occaſion ſome degree of confuſion, and obſcurity; but the difficulty of determining preciſely in theſe caſes, is ſtill increaſed by another circumſtance, which is, that in ſome inſtances, different kinds of miſchief produce almoſt the ſame ſymptoms.

For example: the head is ſometimes ſo ſhaken, as to occaſion a diſorder in the medullary ſtructure of the brain, without any apparent breach of veſſels, or effuſion of fluid; this is called a commotion. If it is to a conſiderable degree, it is often attended with a ſtupor, or loſs of ſenſe, and of voluntary motion: the extravaſation of blood or ſerum between the membranes, on the ſur-

ſurface of the brain, or in the ventricles, is frequently accompanied with the ſame kind of ſymptoms; but tho' the effects are nearly ſimilar, yet the cauſes are very diſtinct.

The ſymptoms brought on by the preſſure of a piece broken off from the inner table of the ſkull, are ſcarcely diſtinguiſhable from thoſe produced by blood or lymph preſſing on the brain, each of which is certainly a very different cauſe of miſchief.

These combinations of cauſes and ſymptoms, and the uncertainty which neceſſarily attends them, make this a very diſagreeable part of ſurgery: but merely lamenting, will never mend it; and as the incon-

venience which we feel is great, our attempts to get information ought to be in proportion.

By a minute examination into a number of theſe caſes, poſſibly we may find, that tho' a clear and perfect knowledge of them is not attainable by us, yet more information is to be gained, than an inattentive practitioner is aware of. It may perhaps, upon a more cloſe inquiry, be found that ſome of thoſe which appear to have many of their ſymptoms in common, have ſtill ſome peculiar characteriſtic, ſome mark by which they may be diſtinguiſhed from each other, and by which the moſt proper method of treating them may be indicated.

If this could be reduced to any tolerable degree of certainty, it would be a great acquiſition; for at preſent there is no part of ſurgery, in which many people are ſo much puzzled as in this: general terms are made uſe of, by which no preciſe idea is conveyed, and the ſurgeon not being clear in his own conception, of the nature of the diſeaſe, is at a loſs how to account for it to others, or how to act moſt properly in attempting to relieve it.

Whether it is abſolutely neceſſary to perforate the ſkull immediately, or not hazardous to defer it; what conſequences will moſt probably follow from the one or the

other; what appearances portend good, what ill; what ſymptoms are capable of being relieved, and by what means; are things which every man who calls himſelf a ſurgeon, ſhould know as perfectly as the nature of the thing will admit; and which are to be known only by frequent and cloſe attention.

To prognoſticate, means no more than to judge of probable events, by a compariſon of ſimilar caſes: this is an act of deliberate judgment, and therefore, in this part of our art a man generally ſhews what his real abilities are.

To be able to foretel approaching miſchief, is as neceſſary to a practitioner, as to predict ſucceſs; friends

friends and relations have a right to be informed of the motives of a ſurgeon's conduct; and what is ſtill more, he ſhould be able to ſatisfy himſelf that it is rational, and that he does his duty.

THE only means by which true and uſeful knowledge is to be obtained, in this and in every part of ſurgery, are, a competent knowledge of the anatomical ſtructure of the human frame; a cloſe attention to the ſymptoms of diſeaſes in the living, and a minute examination of the appearances in the dead: theſe are the great fountains of all medical knowledge, and by theſe very uſeful information is ſtill to be had, even in this obſcure part of it.

By theſe it will among other things be found, that fractures of the cranium, conſidered abſtractedly, are not attended with thoſe ſymptoms, or that danger, which are commonly ſuppoſed; that large quantities of matter may be formed between the dura mater and ſkull, without any previous effuſion of blood; and, that the detachment, and putrefaction of that membrane, tho' leaſt taken notice of by modern writers, is a more frequent cauſe of bad ſymptoms, and of death, than all the others put together.

The great length of time which often intervenes between the receipt of the injury, and its fatal effects; the

the ſeemingly ſafe ſtate of the patient during that interval; the very terrible ſymptoms which ſometimes follow very ſlight blows on the head; and the little power of art in many caſes to reſiſt, or to remove them; contribute to make this a very melancholy part of practice, and render the ſmalleſt acquiſition of knowledge worth all our trouble.

Too many of theſe accidents are indeed quite out of the reach of all aſſiſtance; but even in deplorable caſes, there is ſome kind of ſatisfaction in being acquainted with the true cauſe of the miſchief; in knowing what it is which renders our pains fruitleſs; and in believing that we

we have done all that the nature of the caſe will admit of.

Eſt quodam prodire *tenus* ſi non datur ultra.

My intention in the following pages, is to inquire into ſome of the ills to which mankind are liable, from injuries done to the ſkull and its contents; in doing which, I do by no means intend a regular treatiſe, but only to put together ſuch practical remarks on the moſt intereſting circumſtances attending theſe diſorders, as my obſervation and reading, have at different times ſuggeſted to me. Many things, which ſhould neceſſarily make part of a complete formal treatiſe, will be omitted, as being no part of my deſign.

If in ſome few particulars I ſhall be found to differ from the commonly received doctrines, I muſt beg leave to obſerve, that it is not the conſequence of mere opinion, haſtily embraced, but the effect of a careful attention, to the repeated opportunities which a large, publick hoſpital has furniſhed me, of ſeeing and examining ſuch caſes.

I could produce many hiſtories to confirm my aſſertions, if I thought that they would add to their uſe or force, but have ſuppreſſed them, becauſe they do not appear to me likely to do either, as the reader muſt ſtill depend upon my veracity, as much in one inſtance as in the other; the man who

is capable of aſſerting what he knows to be falſe, muſt have a very defective imagination not to be able to form caſes in its ſupport.

The quotations in the notes, may poſſibly be thought too numerous, and I may, on that account, be charged with affectation, but whoever does this will do me injuſtice. The antient methods of treating theſe diſorders are not known to every practitioner, and conſequently many of them are unacquainted with the real merit of modern improvement; beſide which, many of the beſt of the old writers have particularly conſidered this ſubject, and have made very ſenſible animadverſions upon it. As they attended

tended very cloſely to the appearance of diſeaſes, their pathological obſervations are in general very accurate, and the judgments formed from thence extremely juſt: theſe, and theſe only, were the reaſons that induced me to quote ſo freely, in order to prove the truth of my aſſertions in the firſt inſtance, and to do juſtice to the memory of the antients in the ſecond.

Few people are capable of judging impartially of themſelves, or of their own productions; and the following pages may poſſibly prove, that I have greatly overrated my own abilities in the attempt.

If I have treated the ſubject in ſuch a manner as to give ſatisfaction

to thoſe who are judges, and any degree of information to thoſe who ſtand in need of it, I ſhall be much pleaſed: if I have failed in both, I can only plead the goodneſs of my intention, and beg the reader's pardon for making him miſpend his time; wiſhing that ſomebody more capable, would execute it better; as it is a point in which mankind are much intereſted, and which is by no means ſufficiently underſtood by many who are daily liable to be employed in it.

The judicious reader will, I make no doubt, find ſome things which he will object to; but there is one too frequent fault in medical books, which I hope he will not

not find me guilty of; I have paid no compliment to ſurgery, at the expence of truth; nor have I endeavoured to avail myſelf of what ſeems the prevailing character of the times, viz. a propenſity to believe implicitly, whatever is advanced boldly [b].

WHERE our art is capable of doing good, or of being improved, I have aſſerted it freely; where it is deficient, or ineffectual, I have acknowledged it candidly, leaving the arts of deluſion and falſehood, to thoſe who think them worth employing; to thoſe who, tho' equally ignorant and ſhameleſs, are by the credulity of the multitude, and the prevalence

[b] I mean in matters of phyſic and ſurgery.

lence of faſhion, largely rewarded for poiſoning, blinding, tormenting, mutilating, and murdering mankind, under the titles of DISCOVERERS OF SPECIFICS, OCULISTS, CANCER-CURERS, AND OPERATORS FOR RUPTURES.

The reader is deſired, in page xvi, line 5, of the preface, after the word *parts*, to put a ſemicolon followed by a ſmall *a*; in page 12, line 19, to remove the comma from the word *ſeparation*, and place it to the next word *extended*; in page 69, line 15, for *this*, to read *the*; in page 116, line 11, inſtead of *ſufficiency* to read *inſufficiency*; and in page 131, line 5, inſtead of *light*, to read *tight*.

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WOUNDS and CONTUSIONS OF THE HEAD.

SECT. I.

ALL the injuries which the cranium is capable of receiving, may be brought under three general heads; wound, contuſion, and fracture.

UNDER the term wound may be comprehended, every kind of penetration beyond the ſurface of the bones, made by the point or edge of any inſtrument or weapon; and all

removals of parts of the bones, by means of any cutting body, ſuch as hatchet, broad-ſword, axe, ſabre, &c.

THAT all bones which conſiſt of two tables, with an intervening meditullium, are capable of being hurt by contuſion, is beyond all doubt; the bones of the cranium therefore are liable to this ſpecies of injury, from their conſtruction merely.

BUT if it is alſo conſidered, that the whole ſkull is covered and lined by a firm ſtrong membrane, of a tendinous kind of ſtructure, plentifully furniſhed with blood veſſels, which paſſing from one membrane to the other, through the meditullium, keep up a conſtant circulation between them; and that the inner of theſe membranes is one of the immediate coverings of the brain; it will appear, that from bruiſes of

parts

will appear, that from bruiſes of parts of ſuch ſtructure, ſo connected, and of ſuch important uſe, great conſequences may ſometimes follow, and conſequently that under the article CONTUSION, many very intereſting circumſtances may occur.

THE word fracture, taken in a general ſenſe, will include every violent diviſion of the parts of a bone, not made by inciſion or puncture.

WOUNDS of the cranium, made by a pointed or piercing inſtrument, are of three kinds:

I. Thoſe which penetrate the firſt or outer table only, and do no miſchief to the inner.

II. Thoſe which paſs through both tables.

III. Thoſe which pierce the outer and break the inner table.

A WOUND piercing the outer table only, and not attended with ſymptoms

toms of any other kind of miſchief, may be treated as ſimple, and ſuffered to heal immediately; but if it is accompanied with ſuch appearances or ſuch complaints as indicate any other injury beſide the mere wound in the bone, the treatment muſt be varied as ſuch other miſchief may require.

The ills which may attend a wound of this kind are ſuch as flow from the mere force with which it is inflicted, and are, extravaſation of fluid; contuſion, with all its conſequences, both with regard to the ſkull and the membrane underneath; and concuſſion of the brain.

If the inſtrument has paſſed thro' both tables, it is not very likely that the dura mater has eſcaped being wounded; from whence hæmorrhage or inflammation are to be expected: the loſs of blood is ſeldom large indeed, but the danger in this caſe

caſe ariſes from the inſinuation of a quantity of it between the cranium and membrane, where it will produce all the bad effects of any foreign body. A puncture of the dura mater, like the ſame kind of wound in every other tendinous or firm membrane, is capable of exciting very terrible inflammation; and one of the known effects of a ſmart blow upon or contuſion of the ſkull, is the ſeparation and putrefaction of the membrane under it.

The ſtructure, uſes, and connections of the dura mater, render each of theſe of the utmoſt conſequence to the patient.

An inflammation is generally attended with a fever, which eludes our utmoſt ſkill: the putrefaction or ſuppuration of it is moſt frequently fatal; and the confinement of blood, either between it and the

ſkull, or between it and the brain, is productive of very bad ſymptoms and great hazard.

The ſymptoms of an extravaſation are ſuch as are produced by the preſſure it makes on the brain and nerves, viz. Vomiting, drowſineſs or great propenſity to dozing, a ſtupid inattention to external objects, and the defect or loſs of voluntary motion.

These are in a greater or leſs degree, according to the quantity and ſituation of the extravaſated fluid, and are frequently attended with a ſlow, labouring, interrupted pulſe.

The ſymptoms of inflammation or ſuppuration of the dura mater are all of the febrile kind; quick pulſe, hot and dry ſkin, fluſhed cheek, inflamed eye, anxiety, reſtleſneſs,

leſneſs, nauſea, vomiting, rigor, and delirium. [a]

HENCE it appears, that mere extravaſation of blood, and inflammation of the dura mater, are very diſtinct cauſes of miſchief, and accompanied by very different ſymptoms. A proper attention to this, will frequently give us an opportunity of diſtinguiſhing the one from the other, and thereby not only produce that ſatisfaction which neceſſarily ariſes from believing that our conjectures are well founded and true, but will alſo, in ſome inſtances,

[a] Vomiting is a general tho' an equivocal ſymptom; it always indicates ſome violence offered to the brain, tho' it does by no means inform us, of what kind. It has always been reckoned among the ſymptoms of a fracture of the cranium; but, as it moſt frequently attends every kind of external injury offered to the head, by which the brain is either ſhook or preſſed on, it ſhould always be regarded as an indication of violence done to that part, and accordingly put us on our guard; tho' we cannot from thence conclude, with any degree of certainty, of what particular kind the miſchief is, nor whether it will remain or not.

ſtances, point out the moſt proper method to be purſued, in order to obtain relief: for tho' the curative proceſs is in general nearly the ſame in both caſes; yet, in ſome reſpects, they vary enough to render a knowledge of the immediate cauſe extreamly well worth obtaining, where it is poſſible.

For example, Extravaſation of blood, if large, or attended with urgent ſymptoms, is hardly ever relieved without perforation of the ſkull; and the more preſſing the ſymptoms are, the ſooner ſhould the operation be performed. Neither evacuation, nor any other means, are ſufficient to obviate the ill which this preſſure will produce; and all other attempts are worſe than uſeleſs, as they often occaſion a loſs of that time and opportunity, which are never to be had again.

INFLAMMATION of the membrane always requires, and if ſlight ſometimes yields to, large bleeding, gentle purging, and a general febrifuge cooling regimen. The time employed in theſe methods is not loſt, but will turn to the patient's advantage, even tho' perforation of the cranium ſhould become neceſſary afterward: ſo that, in the one caſe, we ſhould perform the operation immediately without delay; and, in the other, we are vindicated in trying whether we cannot prevent it.

WHETHER the trephine be applied for the diſcharge of extravaſated blood, or for the relief of the wounded or inflamed membrane, the intention is thereby to make ſuch an opening, as may give free diſcharge to blood, ſerum, or matter, which either is or may be collected

lected or formed, upon or under the ſurface of the dura mater.

The crown or ſaw of the inſtrument uſed upon this occaſion ſhould be large, and it ſhould be ſo ſet on, as to have the wound in the bone as near as can be in the center of its circle.

When the piece of bone is removed, and the dura mater laid bare, the ſtate and circumſtances of this membrane will determine the future conduct.

If it is wounded, or ſeems likely to inflame, it ſhould be dreſſed with the ſofteſt applications poſſible; while by bleeding, lenient purges, and a proper general regimen, all endeavours are uſed to appeaſe the inflammation, and prevent the membrane from becoming ſloughy.

If it is found conſiderably detached from the inſide of the cra-

nium, or already ſloughy or purulent, the operator muſt conſider, whether the opening he has made will be ſufficient to anſwer the intention; and, if it is not, the inſtrument muſt be applied again, in ſuch manner as ſhall ſeem moſt likely to ſerve the purpoſe.

If the caſe is a ſimple extravaſation of blood, and the quantity is ſmall; if it lies on the outer ſurface of the dura mater, immediately under the perforation, and is neither diffuſed to any diſtance, nor has conſiderably detached the membrane from the inſide of the bone; the ſymptoms may poſſibly remit, upon the diſcharge of the coagulum, and the patient, by proper general treatment, may ſoon get well.

But if the quantity of blood is large, or diffuſed to a conſiderable diſtance, the caſe is worſe, and the event

event more doubtful: a large quantity makes a greater preſſure, produces more urgent ſymptoms, and is more difficultly diſcharged than a ſmall one. Beſide which, more miſchief is to be feared in future, from the large detachment of the dura mater from the inſide of the ſkull, even tho' all the extravaſated blood ſhould be diſcharged, and the ſymptoms proceeding from preſſure diſappear: for the ſmall veſſels, which united the outer ſurface of the dura mater to the inſide of the cranium, being broke, and all communication between that membrane and the ſkull being thereby deſtroyed, the former becomes ſloughy or purulent as far as ſuch ſeparation, extended matter is collected on its ſurface, and the ſymptoms attending ſuppuration ſucceed to thoſe which

which were occaſioned by mere preſſure.

All this may happen, if the extravaſated fluid lies on the outſide of the dura mater; but if it is underneath, between it and the pia mater, the caſe is ſtill worſe.

I must acknowledge, that I am far from agreeing to the opinion that the diviſion of the dura mater is a matter of indifference. I think I could produce reaſons, ſupported by experience, which would prove the contrary; but be that as it may, in theſe circumſtances it becomes abſolutely neceſſary, and muſt be done; the extravaſated fluid has no natural outlet, and cannot remain between or under the meninges, without great hazard to the patient.

Here alſo, as in the caſe of extravaſation upon the ſurface of this membrane, if the quantity is ſmall,

lies

lies all together, and immediately under that part of it which is laid bare by the trephine, the patient has much more chance of being relieved by the diviſion of it, than in the contrary circumſtances of large quantity, or diffuſed to a conſiderable diſtance.

Much more might be added on this ſubject, but as the proper treatment of all theſe caſes, will be fully ſpoke of under the articles of contuſion, extravaſation, and concuſſion; I ſhall, to avoid prolixity and repetition, refer the reader thither.

All that has been ſaid in the preceding part of this ſection, of wounds of the ſkull made by ſuch inſtruments or bodies as pierce, or as it were wound it by puncture, is applicable, with very little variation, to ſuch large weapons as remove

parts

parts of it, or wound it by inciſion, ſuch as broad-ſword, ſabre, ax, &c.

If a piece of the cranium is totally ſeparated from the reſt, but is ſtill attach'd to the pericranium and ſcalp; it may, if there are no bad ſymptoms, be worth while to replace it immediately, and endeavour to procure its reunion: if the attempt ſucceeds, a good deal of time is ſaved; if it does not, the piece may be removed at any time.

If a portion of the outer table only is cut off, and no other miſchief appears to be done, it may be treated as ſimple, at leaſt until bad ſymptoms come on, which are always to be feared; it very rarely happening, that ſuch force is applied to the head, as to remove a portion of the ſkull, but that at the ſame time, it either cauſes an extravaſation, or does ſome material miſchief to the

parts

parts within; by which the nature of the caſe, and the proper method of treating it, are neceſſarily altered.

It ſometimes happens that an external body pierces the outer table of the ſkull, and is ſtopt by the inner, which it breaks, and by that means produces a fracture of one table only. The ſame effect ſometimes flows from a blow, which does no apparent miſchief to the external table.

This fracture is of different extent in different caſes; but whatever may be the ſize of the broken piece, it either keeps its place, and does not alter the equality of the internal ſurface of the ſkull, or it is removed from its natural ſituation, and preſſes on, or wounds, the membranes or brain.

If the broken fragment is not depreſſed, and no injury is done to the

dura

dura mater, by its being wounded or detached from the bone, it poſſibly may produce no bad ſymptoms, and may paſs off totally undiſcovered.

Of this there are many inſtances upon record; the veſtigia of fractures of the internal table have been diſcovered after the death of thoſe who, while living, were not hurt by them; at leaſt, not in ſuch manner as to indicate whence the miſchief aroſe, or to make any chirurgical proceſs neceſſary.

That many perſons, whoſe ſymptoms have been ſuppoſed to proceed from concuſſion, or extravaſation, have been deſtroyed by this kind of undiſcovered fracture, I make no doubt; while others have ſuffered ſome partial injury [b], or, tho' they

 have

[b] Platner gives an inſtance of a fracture of this kind, diſcovered nine years after it happened; the patient died of

have at firſt had ſome alarming ſymptoms, from the general effect of the blow, yet the piece not being diſplaced, nor the dura mater injured, and its inflammation being by evacuation and general remedies prevented, they have eſcaped farther miſchief.

If the broken piece is depreſſed, and merely bears on the ſurface of the dura mater, without injuring its texture, the ſymptoms are thoſe of preſſure made on the brain, and nerves; ſtupidity, inclination to ſleep, loſs or failure of ſenſe and voluntary motion, &c. all which, as they are produced by the ſituation of the broken fragment, appear immediately, or very ſoon after the accident.

If

of ſome other diſorder, and he, Platner, was induced to examine his head, by his having been deprived of memory, and rendered deſipient from the time he received the blow.

Other inſtances of this kind of fracture, are to be met with in the writers of obſervations.

If the force which breaks the bone is ſo great as to cauſe a ſeparation of the dura mater from the inſide of the cranium; or if that membrane is ſo injured in its texture, as to inflame, or become ſloughy; the ſymptoms attending the formation and confinement of matter under the ſkull, will indicate ſuch miſchief. Theſe, I have already obſerved, are of the febrile kind, and do not come on until ſome days after the accident.

In both theſe inſtances, the application of the trephine is abſolutely neceſſary: for if the broken piece preſſes on the membranes, ſo as to produce bad ſymptoms, it muſt be removed at all events; and if ſuppuration is the conſequence of the dura mater being wounded, or detached, nothing but perforation

of the cranium can give the leaſt hopes of relief.

Sect. II.

Of Contuſions of the Head.

THE bones of the cranium, like moſt of the other flat ones, conſiſt of two tables, ſeparated from each other by a cellular or reticular kind of ſubſtance.

This ſubſtance ſerves for the diſtribution, and ſuſpenſion of an infinite number of membranous cells, plentifully furniſhed with blood-veſſels, and containing an oily matter, in nature and office analogous to the medulla in the long bones.

From this general idea of their ſtructure, it is obvious, that by violent

lent blows the two tables may be compreſſed together; or, to ſpeak more properly, the outer table may be ſo beat in upon the under one, as to bruiſe and do much injury to the cellular bony ſubſtance, and its medullary membrane.

ACCORDING to the degree of this compreſſion, theſe parts will ſuffer more or leſs; and if they are ſo much hurt as to inflame and ſuppurate, the matter, having no natural outlet, neceſſarily ſpoils a part of the bone, and renders it carious [c].

The caries, thus produced, affects ſometimes one table only, and ſometimes both; and the exfoliation, which is the neceſſary conſequence

[c] When the lues venerea affects the ſkull with that kind of caries which ſpreads wide, without making any conſiderable elevation of the ſurface of the bone, the medullary membrane is the original ſeat of the diſeaſe; the reticular ſubſtance is expanded, and the exfoliation is moſt frequently of both tables, and to a conſiderable extent.

of this diſeaſe, is alſo ſometimes of one table only, and ſometimes of both [d].

That this is now and then the effect of bruiſes on the head, is well known to practitioners, both antient and modern; but the principal and moſt frequent miſchief attending ſuch contuſion, ariſes from the intimate connection of the pericranium, cranium, and dura mater, with each other.

The ills produced by blows, in conſequence of this connection of parts, have moſt commonly been confounded with thoſe ariſing from other immediate cauſes, under the general term concussion; a term which ſtrictly and properly ſignifies a cauſe

[d] The deſtruction of both tables of the ſkull is particularly remarked by Celſus. — Vix unquam nigrities integrum, caries per totum os perrumpit; maximeque ubi vitiata calvaria eſt.

a cauſe of miſchief, but conveys no idea of its particular effects.

The ſymptoms which have been produced by extravaſation of blood, or ſerum; thoſe proceeding from commotion of the medullary ſubſtance of the brain; and thoſe occaſioned by the preſſure of undiſcovered fractures; have all of them, at times, been indiſcriminately attributed to concuſſion; which, from the obſcurity this part of ſurgery has been ſuffered to remain in, has been thought a ſufficient ſolution, without entring any farther into the preciſe effects of ſuch particular cauſe.

These effects are various, and very often much complicated with each other; but as they are alſo ſometimes very diſtinct, and as there are ſeveral other cauſes of bad ſymptoms of wounds of the head,

beſide concuſſion, it may poſſibly be of ſome uſe, to diſtinguiſh them as exactly as the nature of the ſubject will admit.

The particular diſeaſe, of which I mean now to ſpeak, is attended with ſome ſymptoms almoſt peculiar to itſelf; ariſing from miſchief done by the blow to the parts in immediate contact with the ſkull, viz. the pericranium, medullary membrane, and dura mater. The other parts contained within the cavity, tho' they may be injured by the ſame accident, yet have no neceſſary connexion with this particular complaint.

As this kind of injury is very different in its nature from extravaſation and commotion, ſo, when it is ſimple and uncombined, does it produce very different effects: but as it is alſo very often connected with

other ills proceeding from the ſame violence; this accidental complication has been the occaſion of much confuſion in the deſcription, and much unſteadineſs in the treatment of theſe diſorders.

The pericranium is ſo firmly attached to the external ſurface of the ſkull, as not to be ſeparable from it without violence; and when ſuch violent ſeparation is made in a living ſubject, the cranium bleeds freely from an infinite number of ſmall veſſels, which go into, or come out from, the cellular texture between the tables.

The dura mater is a firm, ſtrong membrane, as intimately attached to the inſide of the ſkull as the pericranium is to the outſide, and by the ſame means, viz. its veſſels. Theſe are of various ſizes, and paſs thro' the pores and foramina of almoſt every

every point of the internal ſurface of the cranium into the meditullium; by which means a conſtant circulation is carried on between the pericranium, the internal part of the bone, and the dura mater.

That this is truly the caſe, is clear from all the appearances which attend the ſcalping a living perſon, or the ſeparation of the cranium from the dura mater of a dead one.

In the firſt, blood will be ſeen iſſuing from almoſt every pore of the outer ſurface of the bone, eſpecially if the ſubject is young. In the ſecond, not only ſome force will be found neceſſary to detach the ſawed ſkull from the membrane; but, when it is removed, an infinite number of bloody points will be ſeen all over the whole ſurface of the dura mater. Theſe, if wiped clean, immediately become bloody

again, being only the broken extremities of torn veſſels; and as theſe veſſels are largeſt and moſt numerous at the ſutures, ſo there the adheſion is the firmeſt *.

It has been thought by many, that the dura mater was attached to the ſkull at the ſutures only; that in all the ſpaces between them it was looſe and unconnected; and that it enjoy'd a conſtant oſcillatory motion, or was alternately elevated and depreſſed. This, tho' it has really no foundation in truth, yet being inculcated by ſome writers of eminence, has miſled many in their opinions, not only of the ſtructure and diſpoſition of this membrane, but of the nature of ſome of its diſeaſes.

The

* Theſe veſſels, or bloody points, are moſt conſpicuous in the heads of maleſactors, who have been hanged; or in young people who die apoplectic; for reaſons which are obvious.

The dura mater does to the lower ſurface of the bones of the cranium the office of perioſtium, in the ſame manner as the pericranium does to the upper: to this it is ſo univerſally and firmly attached, as to be abſolutely incapable of any the leaſt motion. The alternate elevation and ſubſidence, which are obſervable when any portion of it is laid bare in a living ſubject, are nothing more than the motion of the blood thro' the arteries of the brain.

By blows, falls, and other ſhocks, ſome of the larger veſſels which communicate between the dura mater and ſkull are broke, and a quantity of blood is ſhed upon the ſurface of that membrane. This is one ſpecies of bloody extravaſation, and indeed the only one which can be be-

between the cranium and dura mater.

If the broken veſſels are few, and the quantity of blood ſmall, the ſymptoms are ſlight, and by proper treatment ſoon go off: if the broken veſſels are large or numerous, and the quantity conſiderable, the ſymptoms are urgent in proportion: but whether they are ſlight or alarming, whether they appear immediately or not, they are always ſuch as indicate preſſure made on the brain and nerves, *viz.* drowſineſs, the diminution or loſs of ſenſe, ſpeech, and voluntary motion.

This is one very frequent conſequence of blows on the head: but it alſo often happens from the ſame kind of violence, that ſome of the ſmall veſſels which carry on the circulation between the pericranium, ſkull,

ſkull, and dura mater, are ſo damaged as not to be able to execute that office any longer, tho' there are none ſo broke as to occaſion an effuſion of blood.

SMART and ſevere ſtrokes on the middle part of the bones, at a diſtance from the ſutures, are moſt frequently followed by this kind of miſchief[f]: the coats of the ſmall veſſels which ſuſtain the injury, inflame and become ſloughy; and in conſequence thereof the pericranium ſeparates from the outſide of that part of the bone which receives the blow, and the dura mater from the inſide; the latter of which membranes, ſoon after ſuch ſeceſſion, inflames, and in due time becomes ſloughy alſo.

THIS

[f] Every other part of the bone is equally liable to this kind of injury; but as the veſſels are conſiderably larger at the ſutures than they are in the middle of the bone, a blow on theſe is apt to produce a bloody extravaſation alſo, and thereby render the caſe complex.

THIS is a very different diſeaſe from extravaſation or commotion, and is alſo attended with different ſymptoms [z].

ALL the complaints produced by extravaſation, are ſuch as proceed from preſſure made on the brain, and nerves; and from obſtruction to the circulation of the blood

[z] The difference betwixt theſe two effects of contuſion ſeems to be very well underſtood by Beringarius Carpenſis, who ſays, "Interdum etiam a contuſione non rumpitur ali-" qua vena, ſed rumpuntur ligamenta illa duræ matris, a " quibus reſudat aliquid: hiſce vero, niſi ſuccurratur, ac-" cidunt ſæva accidentia et mors."

Paulus Ægineta alſo has been very particular in diſtinguiſhing between that degree of contuſion which affects only the outer table and meditullium, and that which injures the dura mater: "Porro contuſionis hujus duæ exiſ-" tunt differentiæ; vel enim calva per totum ipſius craſſitiem " contunditur, ut frequenter etiam cerebri membrana abſceſ-" ſu occupetur, vel omnino a calvaria hæc per totum, aut non " per totum, premitur; ſed exteriorem duntaxat ſuperficiem, " uſque ad laminam ſecundam depremitur."

Hippocrates alſo has very juſtly remarked the different extent and effects of contuſion of the cranium: "Contundi " quaque os poteſt, quamvis in ſuo ſtatu maneat, et nulla " oſſi colliſo ſe jungat rima. Sunt vero contuſionis ſpecies " plures; etenim plus aut minus contunditur, aut contuſio " pervadit totum os, aut in ſummo magis hæret, non in " toto."

Hippoc. de vuln. capit.

blood thro' the former; ſtupidity, loſs of ſpeech, ſenſe, and voluntary motion, obſtructed reſpiration, &c. and, which is of ſome conſequence to remark, theſe ſymptoms appear immediately, if the effuſion is at all conſiderable.

The ſymptoms attending ſuch a ſtate of the membranes as I have juſt now deſcribed, are all of the febrile, inflammatory kind; pain in the head, reſtleſneſs, and want of ſleep, frequent and hard pulſe, hot and dry ſkin, fluſhed cheek, inflamed eye, nauſea, vomiting, rigor; and, toward the cloſe, convulſion and delirium: and none of theſe appear at firſt, ſeldom until ſome days are paſt.

One ſet of ſymptoms are produced by an extravaſated fluid, making ſuch preſſure on the origin of the nerves, as to impair or aboliſh voluntary

voluntary motion and the ſenſes; the other are occaſioned by the inflamed or putrid ſtate of the membranes covering the brain [h]; ſeldom or ever affecting the organs of ſenſe or motion until the latter end, when a large quantity of matter is formed, which muſt preſs like any other fluid.

I AM ſenſible that it is a generally received opinion, that blood ſhed from its veſſels, and remaining confined in one place, will become pus; and that the matter found upon the ſurface of the dura mater toward the end of theſe caſes, was originally extravaſated blood; both which poſitions I apprehend to be falſe. THAT

[h] "Sed accidentia quæ ſequuntur ad prædictam contuſionem inter commiſſuras, non ſunt per contuſionem tantum, ſed ſunt per putrefactionem panniculi læſi.—Et cum venit ad certam quantitatem determinatam, incipit febris et alia accidentia, et tandem ſequitur mors, niſi cito ſuccurratur, quamvis etiam tunc ſit difficile ſuccurrere."

JACOBUS BERENGARIUS CARPENSIS.

That pure blood ſhed from its veſſels will never turn to or become matter, is proved inconteſtibly by every day's experience in many inſtances; in aneuriſms by puncture, in retenſions of the menſes, by imperforate vaginæ, and indeed by every conſiderable ecchymoſis. True pus cannot be formed from blood merely, as may be known from the formation of all abſceſſes, and from every circumſtance attending ſuppuration: and that the matter found upon the ſurface of the dura mater, after contuſions of the head, never was blood, I am as certain as obſervation and experience can make me. Some of the French writers have divided the ſymptoms of what they call a concuſſion, into two ſorts, and have named them primitive or original ſymptoms, and ſecondary or conſequential ones. Among

mong the firſt, they rank immediate loſs of ſenſe, flux of blood, involuntary diſcharge of urine, or fæces, great propenſity to ſleep, &c. Among the ſecond, they reckon fever, nauſea, rigor, delirium, and convulſion.

The firſt they impute to the extravaſation of blood upon the membranes of the brain; the ſecond, to the putrefaction of that blood: and in this they have the authority of ſome of the beſt writers among the Ancients, to whom I would pay all poſſible regard and deference, without hurting truth; but the fact is moſt certainly otherwiſe.

It is true that the ſymptoms are very different, and very diſtinguiſhable from each other, as well in their nature, as in the time of their acceſs; and ſo far theſe Gentlemen are right: but they are much miſta-

ken, when they attribute them to the ſame cauſe: for the firſt are occaſioned either by the preſſure of an extravaſated fluid, or a commotion of the medullary part of the brain; and the ſecond, by the inflammation, and conſequent putrefaction, of the dura mater.

THESE are undoubtedly very different cauſes; and tho' they are ſometimes found complicated in the ſame patient, and produced by the ſame violence, yet they are alſo very often perfectly diſtinct, as any one who will carefully and diligently attend, both to the living and the dead, will find.

ACCORDING to ſome varying and accidental circumſtances, this effect of contuſion is diſcovered ſooner or later.

SOMETIMES the ſcalp is ſo little hurt, as not to claim even the patient's

tient's own regard; in ſome caſes it is much bruiſed, and in others it is wounded: ſometimes no other injury is done to the parts within the ſkull, than that of which I am now ſpeaking; and at other times the ſame force which occaſions this diſorder, produces alſo extravaſation of fluid, fracture of the cranium, commotion of the brain, &c. And when any of theſe happen, the ſymptoms which neceſſarily attend ſuch other injuries ariſe, and the caſe becomes complex.

I SHALL firſt conſider it by itſelf, independant of all other miſchief.

IF there is neither fracture, commotion, nor extravaſation, and the ſcalp is neither much bruiſed nor wounded, the injury is not diſcovered, or attended to, for ſome days; at the end of which the patient feels pain in the part where he received

ceived the blow: this pain, tho' moſt exquiſite in that immediate point, is extended more or leſs over the whole head, and is accompanied with a diſagreeable languor, or failure of ſtrength, an increaſed velocity of pulſe, and diſturbed ſleep.

A DAY or two after this, if no means preventive of inflammation are uſed, the part ſtruck ſwells, and becomes puffy; and if it is now divided, the pericranium is found of a darkiſh hue, and detached from the ſkull, with a ſmall quantity of a brown ichor between them.

THE colour of that part of the cranium from which the pericranium is detached, is even at this time ſomewhat different from that of the reſt of the bone. Of this alteration it is not eaſy to convey an idea by words, tho' it is a very viſible one: ſome of the beſt writers have

have taken notice of it; and all who have attended to it, will know it when they ſee it [i].

From this time the ſymptoms advance more haſtily, the fever increaſes, the ſkin is hotter, the pulſe quicker and harder, the ſleep leſs and more diſturbed, and the patient is ſhook by irregular rigors, which are neither followed by a ſweat, nor afford the leaſt relief.

If the ſcalp has not been removed till the patient is in this ſtate, the alteration of the colour of the bone is more apparent; it is whiter, and drier, and looks, as Fallopius has very juſtly obſerved, more like

[i] Inſpiciatis diligenter os detectum; quod os, quando eſt in natura ſua, eſt coloris ſubrubri, non candidi prorſus, nec rubri prorſus, ſed eſt veluti color mixtus ex albo declinans ad rubicundum, ut ſi multo lacte, vel alio colore candido, poneres parum ſanguinis, vel alterius rei rubræ.

Sed ſi videritis inæqualitatem coloris in ipſo oſſe detecto, ita ut adſint veluti puncta coloris albi et aridi oſſis; quæ aridæ particulæ aliquando majores ſunt, aliquando minores, &c. ſciatis quod os ſit contuſum. Fallopius.

à dead bone; the ſanies betwixt it and the pericranium is more in quantity, and the latter is more inclined to a livid hue. In this ſtate of things, if the dura mater is denuded, it is found detached from the inner ſurface of the cranium, altered from its natural bright tendinous appearance, to a dull ſloughy caſt, and ſmeared over with ſomething glutinous, but has as yet no matter on its ſurface.

Every hour after this period, all the ſymptoms are exaſperated; the heat and thirſt become intenſe, the ſtrength decreaſes apace, the rigors are more frequent, and at laſt convulſive motions, attended in ſome with coma, in others with delirium, finiſh the tragedy [k].

If

[k] The whole proceſs of this diſeaſe, is very accurately and juſtly related by Theodoric:

"Si vero propter ictus vehementiam dura mater ab oſſe "fuerit ſeparata, vel aliquo modo læſa, ſano et illæſo ex-

"iſtente

If the ſcalp is removed during this laſt period, a very offenſive kind of matter is found between it and the cranium; the bone is much diſcoloured; and if the perforation is made in a part of the ſkull where the two tables are moſt diſtant from each other, a diſcoloured ſanies often iſſues from the diploe inſtead of blood: the vacant ſpace, made by the detachment of the dura mater, is filled with matter, which ſometimes inſinuates itſelf over the whole ſurface of that membrane, and is alſo often found between it and the pia mater.

The primary and original cauſe of all this, is the ſtroke upon the ſkull.

" iſtente cranio, ſic cognoſces; cum dolor capitis, et lenta
" febris ſingulis diebus augmentantur, oculorum anguli,
" ac ſi ſpaſmari vellent, aliquantulum diſtorquentur, genæ
" rubent, quod ſignum pravum eſt in qualibet capitis læſione;
" pannus balneatus ſuperpoſitus citius deſiccatur, cutis etiam
" arida et ſicca; et ſi vulnus fuerit et os fuerit diſcoopertum, color oſſis velocius alteretur, &c.

" Et propter negligentiam curæ, ægro ſuperveniunt dolores et febres, ſpaſmus, ſyncope & permiſtio rationis."

Theodoric de Vuln. Capitis.

ſkull. By this, the veſſels which carry on the circulation between the ſcalp, meditullium, and dura mater, are damaged, and no means being uſed to prevent the impending miſchief, or ſuch as are uſed proving ineffectual, that communication ceaſes, and both pericranium and dura mater ſeparate from the ſkull, inflame, and become putrid [1].

WHOEVER will attend to the nature of the ſymptoms, the time of their

[1] The following paſſage from an ancient writer contains a very accurate account of the effects and appearances of ſuppuration or putrefaction, either between the tables of the ſkull, or on the ſurface of the dura mater; the cauſe aſſigned, putrefied blood, is not indeed the true one, but nevertheleſs the deſcription is, in other reſpects, perfectly juſt.

"Concurſio ſanguinis ſubterlabentis, quæ quidem ſub "ſuperiore duplicis oſſis parte fit, ut ſub unguibus mani- "feſta eſt: ſanguis autem tempore in pus converſus, os "livens oſtendit, ſed hanc et cognoſcere, et curare perforando "duntaxat atque humore emanante facilius eſt.

"Quæ vero ſuper cerebri membranam ſit, utraque ra- "tione difficilis eſt; nam et læſis membranis apparet, ideo "enim febres cum horrore accedunt, faciei rubor et calor "longe major quam pro febris modo, ſomnique tumultuoſi, "oculi ſubpingues, et gramioſi, et rubentes.

"Ulcus neque alitur neque pus maturat, et ſordidum ſit."

ARCHIGENES de ſanguine ſubtercurrente.

Petrus

their acceſs, and their progreſs, will find them all eaſily and fairly deducible from this account. For as the detachment of the membrane is not immediate, ſo neither are the ſymptoms. Theſe never appear until ſome days are paſt; that is, until the membranes begin to ſeparate and inflame. The fever is at firſt ſlight, but increaſes gradually, as the dura mater becomes more and more diſeaſed, until matter is collected in ſuch quantity as to bring on convulſion, ſtupor, and death.

HITHERTO I have conſidered this diſeaſe as unaccompanied with any apparent injury of the external parts. Let us now ſuppoſe the ſcalp to be wounded at the time of the accident;

or

Petrus e Largelata, having related the ſymptoms attending the formation of matter under the cranium, in conſequence of a fracture, ſays, "Si autem fractura ſit parva et "penetrans, tunc fiunt illa ſigna poſt aliquod tempus, eo "quod tunc humiditates quæ ſunt ſub cranio putrefiunt; "et tunc fiunt illa accidentia." And then adds, "ſecundo "notes, quod omnia illa accidentia poſſunt advenire *ex* "*percuſſione capitis, cranio non fracto.*"

or that, the ſymptoms being alarming, it has been removed in order to examine the bone.

In this caſe the wound will, for ſome little time, have the appearance of a ſimple wound of the ſcalp; will diſcharge at firſt a thin ſanies, and then matter; will digeſt, begin to incarn, and, in ſhort, look well: but after a few days theſe favourable appearances all vaniſh; the ſore loſes its florid complexion, and granulated ſurface, and becomes pale, flabby, glaſſy, and painful; inſtead of good matter, a thin gleet is diſcharged from it; the lint, with which it is dreſſed, ſticks to all parts of it; and the pericranium, inſtead of adhering firmly to the bone, ſeparates all round from it to ſome diſtance from the edges [m]. At the ſame time that the

[m] "Ubicunque autem ex vulnere intereundum ſit, neque "poſſit homo ſanitatem recipere, neque ſervari, ex his "notis

the ſore undergoes ſuch alteration, and makes ſo morbid an appearance, the reſt of the ſcalp remains in a natural ſtate, free from either inflammation, or tumour.

As the alteration in the ſore is produced by the diſeaſed ſtate of the dura mater, ſo it is confined to that part of the ſcalp which lies immediately over the inflamed, or ſloughy part of that membrane, and does not at all affect the reſt.

THIS is ſo generally true, that tho' the ſcalp has been wounded in, or removed from, other parts of the head, where the dura mater is not detached

" notis intelligere convenit moriturum, et quod futurum eſt
" præſignificare; hyeme plerumque ante diem quartum,
" æſtate poſt ſeptimum, febris accedit, quæ quum ſuper-
" venit, vulnus reddit non ſui coloris, et ſaniem modicam
" effundit, quodque ex ipſo inflammatum eſt emoritur,
" glutinoſum efficitur, et carnem ſale conditam repræſentat,
" *ruffum* eſt et ſublividum, tumque os corrumpi incipit, et
" nigrum fit, læve exiſtens; tandem ſubpallidum vel album
" ſe oſtendit; ubi autem, jam purulentum eſt, aut puſtulæ
" in lingua naſcuntur, laborans mente non conſtante
" conſumitur."

HIPPOCRATES de Vuln. Capit.

detached or inflamed, yet in thoſe places the ſores preſerve a healthy appearance, while the former are in the ſtate juſt now deſcribed, and the ſymptomatic fever is daily increaſing.

NAY, tho' the integuments of the head ſhould be attacked with an inflammation of the eryſipelatous kind, a thing by no means infrequent, and by which the ſcalp is ſwelled, and the patient often much diſordered, yet if the dura mater is every where unhurt and adherent, the ſore will bear no ſuch diſeaſed appearance, as it always does when that membrane is injured; as has been moſt truly, and judiciouſly remarked by Hippocrates [n].

THE

[n] Ubi autem in capitis vulnere ſive ſectio adhibita fuerit, ſive non, oſſe tamen detecto, tumor rubicundus ac ad eryſipelatis naturam accedens in facie, oculis, ſive alterutro, ſive utroque oritur, dolens ad tactum, febris item ſuperveniat et rigor, ulcus vero quod ad carnem attinet, bono eſſe loco videtur; os et quæ juxta ſunt recte procedant, faciei tumore excepto,

THE firſt appearance of alteration immediately ſucceeds the firſt attack of the fever, and as the febrile ſymptoms increaſe, the ſore becomes worſe and worſe.

THRO' the whole time, from the firſt attack of the fever to the laſt fatal period, an attentive obſerver will mark the gradual alteration of the colour of the bone: at firſt it is whiter and drier than the natural; and as the ſymptoms increaſe, and the membrane becomes ſloughy, it inclines gradually more and more to a purulent caſt *.

AND

excepto, neque ullus in victu error commiſſus fuit; alvus homini ſolvenda, medicamento quod bilem detrahit. Si ſic purgatus febris deſinit, tum et tumor evaneſcit, et ſanitati æger reſtituitur. HIPPOCRATES de Vuln. Capit.

* Jacobus Berengarius Carpenſis, has been very particular in his remarks on this head;

" Quando ſanies eſt infra cranium, ipſo non fracto, cra-
" nium eſt male coloratum, et æger ſentit gravedinem in ea
" parte qua eſt ſanies.— Eſt os ſanum illud ſcilicet, cui ad-
" hæret dura mater, coloris albi mixti rubedine.—Et quo
" ſeparatio eſt major, eo major oſſis quantitas eſt mutata in
" colore.—

AND it may alſo be worth while to remark, that if the blow is ſo near to a ſuture as to bring it into view, either by the original wound, or by ſcalping, that ſoon after the dura mater is become ſloughy, and purulent, the ſuture ſeems to ſeparate and let thro' a looſe flabby kind of fungus, which gleets largely, and is painful to the touch—A certain ſign of conſiderable miſchief underneath [p].

I HAVE already taken notice, that in thoſe caſes where the bruiſe of the ſcalp is inconſiderable, and there is neither wound nor other bad ſymptom; that as the patient feels little or no inconvenience, he ſeldom complains

" colore.—Ultra vero colorem cognoſcitur etiam os eo quod " ſiccius ſit ſano.—Et ultra, colorem et ſiccitatem, quando " incipit iſta ſeparatio incipiunt aliqua ſæva accidentia, ut " febris, mentis alienatio, ſtupor, vigiliæ, &c. quia incipit " ſupra panniculum aggregari materia, quæ incipit cor- " rumpi." JAC. CARPENSIS.

[p] Suturas tempore curationis disjungi grave eſt. ARCHIGENES de Signis.

complains until ſome few days are paſt, at the end of which [q] he is attacked with ſuch ſymptoms as I have related, and which ſoon increaſe to ſuch a degree as generally to baffle all our art.

But if the integuments are ſo injured, as to claim our more early regard, very uſeful information may from thence be collected; for whether the ſcalp be cut or torn by the accident, or whether it is found neceſſary to divide, or remove it, for the diſcharge of grumous blood, or on account of worſe appearances, or more urgent ſymptoms, the ſtate of the pericranium and bone will thereby be known.

If the membrane is found detached in the manner which will be

[q] From ſuch obſervation as I have been able to make, it has appeared to me, that the ſymptoms come on much ſooner in the ſummer than in the winter, eſpecially if the weather be hot, or the patient in a cloſe place.

be mentioned, p. 57. it may be regarded as a pretty certain indication, that unleſs the proper means are uſed, the dura mater will ſuffer, and ſuch ſymptoms enſue as have juſt been related: from hence therefore it may be learnt, that no time is to be loſt, but that every means capable of appeaſing or preventing inflammation ſhould be immediately uſed.

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THIS particular effect of contuſion is frequently found in fiſſures and fractures, as well as in extravaſations of blood, where the bone is intire; and, on the other hand, fiſſure, fracture, and extravaſation, often happen without ſuch additional miſchief; all this is matter of accident: but let the other circumſtances be what they will, the ſpontaneous ſeparation of the altered pericranium, in conſequence of the blow,

blow, is almoſt always followed by the putrefaction of the dura mater, the proper ſymptoms of which do not appear until ſome days are paſt; that is, until that membrane begins to inflame, and to be upon the ſtretch; a circumſtance extremely well worth attending to in the caſe of fiſſure, or undepreſſed fracture, as the principal danger attending theſe is owing to this cauſe, as will be more fully explained when we come to ſpeak of ſuch caſes.

It is no unuſual thing for a ſmart blow on the head to produce ſome immediate ſymptoms, which after a few hours diſappear and leave the patient perfectly well. Pain in the head, quickneſs of pulſe, a ſlight degree of vertigo, and nauſea, ſometimes immediately follow ſuch a blow, but do not continue more than 24 hours, eſpecially if any

evacuation is uſed ſoon after the accident. Theſe are moſt probably owing to a ſlight degree of commotion of the brain, which reſt, and the loſs of a little blood, give nature an opportunity of recovering.

But if, after an interval of ſome days, theſe ſymptoms are again renewed; if the patient again becomes feveriſh and reſtleſs, and this fever and reſtleſneſs are accompanied with ſlight rigors, and do not yield immediately to evacuation and a low regimen; miſchief under the ſkull is certainly impending.

This may be in the ſubſtance of the brain, in the ventricles, between the membranes, or on the outer ſurface of the dura mater: of the three former I do not know any certain indications, but of the latter I think there is one which may almoſt be deemed ſo; I mean a puffy tumor

of

of the ſcalp, and the detachment of the pericranium from the ſkull under ſuch tumor. Theſe appearances following a blow, and attended with quickneſs of pulſe, reſtleſneſs, and ſhiverings, generally, I had almoſt ſaid infallibly, indicate an inflamed or ſloughy ſtate of the dura mater, and matter between it and the cranium [r].

It may not be amiſs in this place to explain, in few words, what I mean by a puffy tumor of the ſcalp, and the ſeparation of the pericranium.

[r] Si ſtatim ab initio febris primo aut ſecundo appareat die, illa proculdubio cauſam agnoſcat, perturbationem humorum ac animi, quum vulnus incuteretur; ceſſante cauſâ procatarctica, ac ubi ſe collegerit, æger deſinat illa febricula.

Si vero primis diebus nihil febrile, nec ullum ſymptoma ſentiat æger, ſeque in nullo diſcrimine exiſtumat; hunc ſi ſubito, die ſcilicet ſeptimo vel quarto-decimo (nihil licet in victu rebuſve e[illegible]is peccarit) ac præter expectationem febris invadat, ſignificatur latens aliquod in cranio, cerebro, aut corpore vulnerati.

Pet. Paaw in Hippocrat.

By the former is not meant a general, but a confined, circumſcribed ſwelling of the integuments, produced by the collection of a fluid between the pericranium and ſkull, of little more extent than the ſeparated part of that membrane, not very tenſe or renitent, the quantity of fluid, which makes the elevation, being but ſmall in proportion to the ſize of the tumor.

The ſcalp, upon being either bruiſed or wounded, is, in ſome habits and conſtitutions, liable to be attacked by an inflammation and ſwelling of the eryſipelatous kind, which tumor is not circumſcribed but general.

This is ſometimes the conſequence of the mere bruiſe; ſometimes it is occaſioned by a wound of the ſkin and cellular membrane; and ſometimes it is produced by a puncture

or

or laceration of the tendinous aponeuroſis of the muſcles of the ſcalp.

The firſt of theſe is particularly taken notice of by Hippocrates, and has already been mentioned.

The two others are very diſtinguiſhable as well from each other, as from that occaſioned by the detachment of the pericranium.

That which proceeds from a wound of the ſkin, and cellular membrane, has the appearance of an œdematous kind of tumor, mixed with ſome degree of inflammation; it pits, or receives and retains the impreſſion of the fingers; is not very painful to the touch, ſeldom is attended with any alarming ſymptoms, always comprehends the ears and eyelids, and generally gives way eaſily to bleeding and gentle purging, &c. That which is produced by a puncture or wound

of the aponeuroſis of the muſcles of the ſcalp, is more inflammatory, leſs œdematous, and more painful to the touch: it is ſometimes attended with very diſagreeable ſymptoms, which ſeem to affect even the brain: it never comprehends either the ears or eyelids, and ſeldom is relieved but by a free diviſion of the aponeuroſis and pericranium.

By detachment of the pericranium, I do not mean every ſeparation of it from the bone, but only that receſſion which is produced by the inflamed or ſloughy ſtate of the ſmall veſſels which communicate between the ſcalp, meditullium, and dura mater, which ſtate is the conſequence of contuſion.

The pericranium I know may be, and often is, cut, ſcraped, or torn off without any ſuch conſequence; but theſe ſeparations are violent;

whereas that which I mean is ſpontaneous, and is produced by the deſtruction of thoſe veſſels, by which it was connected to the ſkull, and by which the communication between it and the internal parts was carried on; and therefore it is not the removal of the external membrane, which is the occaſion of the bad ſymptoms, but the inflamed and diſeaſed ſtate of the meninges, in conſequence of the deſtruction of thoſe parts, by which they maintained a correſpondence with the cranium, meditullium, and ſcalp.

In this caſe, the inferior ſurface of the pericranium, which before the accident adhered firmly to the ſkull, is totally detached from it, and is perfectly ſmooth; its colour is very different from that of the ſame membrane in a healthy ſtate, and between it and the bone, a brown thin kind

of

of fluid is generally contained; the quantity of which is larger, and the alteration of the colour of the membrane greater, in proportion to the date of the injury: this is what forms the puffy tumor of the ſcalp, juſt now deſcribed, and which may always be diſtinguiſhed from every other kind of ſwelling of theſe parts.

A FALSE notion prevailed for many years, that the dura mater was not in general connected with the internal ſurface of the ſkull, but adhered to it only at the ſutures; and that in all other parts of it, ſuch a vacancy was left, as gave free room for what they called its pulſatory motion. This opinion, which was embraced by many even of the moſt eminent writers and practitioners, has always appeared to me to be the reaſon why this effect of contuſion of the head, was

not for ſome years duly and properly attended to. The ſuppoſed vacuity was thought ſufficient, in general, to defend the dura mater from all external violence, and the blood and matter ſo often found between the cranium and it, were thought to be depoſited in a ſpace which they found vacant [s]. But who-

[s] If we conſider how very clearly and plainly many of the moſt antient writers deſcribe the intimate connection between the ſkull and the dura mater, and how perfectly well acquainted many of them were with its morbid ſeparation, we ſhall wonder how it came to be forgot; but that it was is moſt certain.

In Hippocrates, Galen, Paulus, Oribaſius, Rhaſes, and others of the antients, are many paſſages which prove this knowledge of the natural ſtructure and adheſion of this membrane: and that ſome of the moſt eminent writers of later times, had either forgot, or did not attend to it, the following quotations, ſelected from many, will evince.

" Dura mater calvariæ connectitur ſuturarum ope, ut " *penſile*, et erectum teneat cerebrum, tum etiam ut per " ſuturas egreſſus pericranium procreat. Spatium vero in- " ter ſuturas recte natura liberum reliquit, ut vacuum " quoddam eſſet inter duram matrem, et calvariam; has " nimirum ob cauſas: primo, ne quicquam ipſius cerebri " ſyſtolæ atque diaſtolæ obſtaret; ſecundo, ne venæ et ar- " teriæ per extremam duræ matris partem ſparſæ, levi " aliquo ictu in cranio facto, rumperentur; poſtremo, ut " ruptis in dura matre venis, ſanguis non inter duram et " piam

whoever will conſider this matter as it really is, will eaſily be convinced of the truth of what I have ſaid.

It ſometimes happens that the ſcalp is ſo wounded, at the time of the accident, that the pericranium is

" piam matrem, ſed inter duram et cranium effunderetur,
" et cranio perforato facilius extraheretur.
" Et hic eſt ordinarius naturæ ordo."

Fab. Hild. Obſ. 7. Cent. 1.

Fælix Wirtz ſays, that the elevation of the ſkull in ſlight impreſſions is needleſs; " Id enim motum cerebri, propter " vacuum et diſtantiam, quæ eſt inter meningem et cra- " nium, minime impedire."

And Hildanus, by way of reproof to Wirtz, ſays, " Ali- " quando duram matrem cranio undique adherere vidimus."

Fallopius, ſpeaking of the dura mater, ſays, " Continuo " pulſat, quare non facile ſanatur."

Petrus e Marchetti ſuppoſed the dura mater to be always at a diſtance from the ſkull, in thoſe who were bald: ſpeaking of the treatment of a particular caſe, he ſays, " Poſt " ſeptimam nempe, oleum Hyperici, quia calvus erat pa- " tiens, atque membrana à calvaria diſtabat; *quod in cal-* " *vis ſemper obſervavi.*"

Aliquando contingit aut dura mater cranio ſatis firmiter adhæreat, ſed hæc admodum raro evenire ſolet, atque præter naturæ conſuetudinem eſt.

Muys Praxis Rational. Chirurg.

This was alſo the opinion of Ambroſe Pare, Serj. Wiſeman, Sylvius, Barbette, Baglivi, and Pacchioni, as well as all thoſe who talk of the oſcillation of the dura mater, or of that membrane lying higher at one time of the moon, or at one age, than at another; the number of which is too large to be inſerted.

is cut or torn away in ſuch manner, as to leave the bone quite bare; and yet the violence of the ſtroke has not been ſufficient to produce the evil in queſtion. In this caſe, if the pericranium is only turned back with the wounded ſcalp, and there is any probability of its reunion, it ſhould be replaced; if this ſucceeds, a good deal of time is ſaved; if it does not, the whole piece muſt be removed, and then the caſe becomes the ſame as if the ſcalp and pericranium had been carried away at the time of the accident; and the worſt that can happen, is an exfoliation from the bare ſkull [t].

IT

[t] Not that exfoliation is the neceſſary conſequence of the ſkull being made bare: this depends on other circumſtances beſide the mere removal of the ſcalp and pericranium. The ſolidity of the ſurface of the bone, the ſize of the veſſels, and the impulſe of the blood thro' them, are what principally determine this.

If the cortex of the bone is not perfectly hard, and the impulſe of the blood thro' the veſſels, is capable of counterballancing the effect of the external air, a granulation of new

It does alſo ſometimes happen, that the force of the blow is ſuch, as to occaſion the miſchief of which I am now ſpeaking; but the ſcalp and pericranium being forced or cut off, at the time the injury was received, there is no criterion whereby to diſtinguiſh it immediately.

In theſe circumſtances the edges of the wounded ſcalp will digeſt as well, and go on as kindly for a few days, as if no miſchief was done underneath; but after ſome time, the patient becomes feveriſh and reſtleſs, and

new fleſh will be generated upon the ſurface of the bone; which will cover and firmly adhere to it, without its throwing off the ſmalleſt ſcale; and this will very frequently happen in young ſubjects. On the contrary, if the bone is much hardened, and the veſſels thereby conſtringed; or if ſuch applications are made uſe of, as will produce an artificial conſtriction of the veſſels, the ſurface of the bone will become dry, and the juices ceaſing to circulate thro' it, it will exfoliate to a certain depth; that is, that part of the ſurface thro' which the circulation ceaſes to be carried on, will be ſeparated from, and caſt off by, the veſſels which circulate the fluids thro' the reſt of the bone.

Might not ſome practical inferences be made from hence, with regard to carious and diſeaſed bones?

and complains of pain in his head, the edges of the ſcalp loſe their vermilion hue, and turn pale and flabby; the ſore, inſtead of ſuppurating kindly, gleets, and the pericranium looſens from the ſkull, which changes its natural colour for one which has already been deſcribed. Immediately after this come on the general ſymptoms, which are almoſt hourly exaſperated, until the dura mater is become putrid, matter collected, and that fatal period arrives, which, tho' uncertain as to the exact number of days, does but too certainly arrive in few.

THE METHOD OF CURE, if ſuch name ought to be given to the very little which ſurgery is capable of doing in many of theſe caſes, conſiſts in two points:

1. To

1. To endeavour to prevent the inflammation, and conſequently the ſeparation of the dura mater.

2. To give diſcharge to matter which may be collected under the ſkull, in conſequence of ſuch inflammation and detachment.

Of all the remedies in the power of art, there is none yet diſcovered equal to bleeding, in inflammations of membranous parts: to the truth of this many diſeaſes bear teſtimony, pleuriſies, hernia's, &c. and if any thing can prevent the ill ariſing from the injury I am now treating of, it is phlebotomy; but then it muſt be uſed truly as a preventive immediately after the accident, before the fever has got to any height; and it muſt be done largely, and repeated often [u]. I

[u] That is, as long as the pulſe requires, and the ſtrength will permit. This may ſeem much to thoſe who have not ſufficiently conſidered the ſubject; but who will alter their opinion, when they come to know that this evacuation will often make all the difference between life and death.

I am very ſenſible that it will often be found very difficult to perſuade a man, who has had what he calls only a knock on the pate, to ſubmit to ſuch diſcipline, eſpecially if he finds himſelf tolerably well. He will be apt to think his ſurgeon too apprehenſive, or guilty of a much worſe fault; and yet in many inſtances, the timely uſe, or the neglect of this ſingle remedy, makes all the difference between ſafety and fatality.

It may perhaps be ſaid, that as the force of the blow, the height of the fall, the weight of the inſtrument, &c. can never determine the effect, nor whether any miſchief is done to the parts under the bone or not, that a patient may loſe a large quantity of blood without any neceſſity, in order to prevent an imaginary evil.

THIS is in ſome degree true; and if the advice juſt given was univerſally followed, ſome few would loſe more blood than was neceſſary: but on the other hand, many a very valuable life would be ſaved, which without this muſt inevitably be loſt.

" Nihil intereſt preſidium an ſa-
" tis tutum ſit quod unicum eſt," is a maxim in medicine: and if it is allowed to uſe ſuch means as are in themſelves hazardous, ſurely it cannot be wrong to employ ſuch as are not at all ſo; at leaſt conſidered in a general ſenſe, whatever they may be to ſome few particular conſtitutions.

WITH regard to the unneceſſary uſe of phlebotomy; tho', as I have juſt now ſaid, it may poſſibly ſometimes happen to the moſt knowing, and the moſt careful, yet in the generality of theſe caſes, there is very

early

early ſomething in the pulſe, and even in the countenance, of which, tho' it is almoſt impoſſible to convey an idea by words, yet is very well underſtood by thoſe who have carefully obſerved theſe matters.

Acceleration, or hardneſs of pulſe, reſtleſneſs, and any degree of anxiety, are always to be ſuſpected, and attended to, after a blow on the head; immediate, plentiful, and repeated bleeding, have removed theſe in ſeveral inſtances; in which I do verily believe, that without ſuch evacution, fatal miſchief would have enſued.

In this, as in every other part of practice, we have no other method of judging but by comparing diſeaſes apparently ſimilar. I have more than once, or twice, ſeen that increaſed velocity and hardneſs of pulſe, and that oppreſſive languor,

which are the general precurſors of miſchief under the bone, removed by free and repeated bleeding; and have too often ſeen caſes end fatally, whoſe beginnings were full as ſlight, but in which ſuch evacuation was either neglected, or not permitted.

I would by no means be thought to infer from hence, that timely bleeding is a certain preſervative in all theſe caſes; and that thoſe only die, in whom it is neglected: this, like all other remedies, at leaſt all that I am acquainted with, is fallible: there are many of theſe caſes out of the reach of it, or any thing elſe; but where any human means can take place, this bids the faireſt, and ſucceeds the moſt frequently.

The ſecond intention can be anſwered only by the perforation of the cranium.

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When from the general ſymptoms, and from the appearances, there is reaſon for ſuſpecting miſchief under the ſkull, this cannot be done too ſoon; the misfortune is, that it is ſeldom done ſoon enough: ſurgeons in general not thinking themſelves authorized to propoſe it, until the appearances are ſuch as indicate the membrane to have become ſloughy, or purulent; at which time that ſymptomatic fever is begun, which rarely ends but with life [x].

This propriety, or impropriety, of applying the trephine, in caſes where there is neither facture, fiſſure, nor ſymptoms of extravaſation, is a point which has been much litigated among practitioners. Where neither of theſe appear, and

[x] So true is the obſervation of Archigenes, "His ubi "cito manus admoveatur ſpes aliqua ſalutis ſubeſt ubi ſe- "rius plerique omnes moriuntur."

where the pericranium remains firm, to all parts of the ſkull, there is certainly no indication where to apply the inſtrument, let the ſymptoms be what they will, and therefore no authority for uſing it at all: but whenever that membrane is found ſpontaneouſly detached from the cranium, and altered in colour, I think there is as good reaſon for trepanning as in the caſe of fiſſure or fracture, if not better; ſince it is by no means impoſſible for theſe to do well without it; whereas the other, if followed by putrefaction, never can.

All the beſt practitioners have always agreed in the neceſſity of trepanning, in the caſe of a ſtroke on the ſkull made by gun-ſhot, even where the bone is not broke; and very good practice it is.

A WOUND by gun-ſhot, as far as it relates to the ſkull, is to be regarded as a very great degree of contuſion, and therefore moſt likely to be attended with the conſequences thereof: among theſe the ſeparation and inflammation of the dura mater ſtands as a principal. Experience confirms both, for moſt of the ſymptoms of gun-ſhot wounds are ſymptoms of contuſion; and the formation of matter, on the ſurface of the dura matter, or the putrefaction of that membrane, is a moſt frequent conſequence.

IN ſhort, the ſpontaneous ſeparation of the altered pericranium, eſpecially if attended with any degree of reſtleſneſs, chilline ſs, or fever, appears to me, from what I have obſerved of its conſequences, to be ſo ſure and certain an indication of miſchief underneath, either in preſent,

or in future, that I ſhould never heſitate one moment about the operation, if bleeding, and general evacuation, had not totally freed the patient from all complaints; or if I did not ſee him until the uſe of theſe means would moſt probably prove ineffectual.

If a portion of the ſcalp, and pericranium, are totally removed at the time of the accident, the trephine may be applied on the bare bone, whenever the ſymptoms ſhall require: but if the integuments are not quite removed, but only bruiſed or torn, and the pericranium is in the ſtate which I have already deſcribed, they ſhould be taken away quite as far as ſuch ſeparation extends; that is, as far as the bone is bare; and then the inſtrument ſhould be applied on ſuch part of it, as will be

be moſt likely to be ſerviceable for the diſcharge of matter.

The ſtate of the dura mater, when uncovered, will in great meaſure determine the ſurgeon's future conduct. In ſome caſes one opening will be found ſufficient[y], in others ſeveral will be required, according to the quantity of the membrane, which is become ſloughy, or according to the diſcharge. The repetition of the operation is warranted by the beſt authorities, and by the nature of the caſe itſelf, there being no compariſon to be made between the inconvenience attending the laying the dura mater bare, and the certain miſchief that muſt follow the confinement of matter under the cranium.

If matter is collected alſo under the dura mater, between it and the pia,

[y] The way to make this moſt frequently ſo, is to uſe a trephine with a large crown, which never can do harm, and will often ſave the trouble of repetition.

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pia, it muſt, at all events, be diſcharged by a diviſion of the former.

THIS being all that ſurgery is capable of doing in theſe melancholy caſes, I wiſh I could ſay that it was more often ſucceſsful; ſometimes it is. The operation is not in itſelf painful, or hazardous, and is the unicum remedium; ſome have been preſerved by it, and none can, in theſe circumſtances, be ſaved without it. As there are no certain indications whereby to judge, whether it will prove ſucceſsful, or not, before it is tried, the event only can determine it; when that is happy, the means are juſtly commended; but when it is not ſo, they ought not to be therefore condemned, ſince they are built on rational principles, and are the only means in human power.

SECT.

SECT. III.

Of FISSURES, *and* SIMPLE FRACTURES *of the* CRANIUM.

FRACTURES of the cranium, were, by the antient writers, divided into many different ſorts, under as many different appellations, which were derived either from the figure of the breach, or from the diſpoſition of the broken pieces.

THESE are to be found in all the old books; but as they merely load the memory, without conveying any uſeful knowledge, or ſerving any practical purpoſe, they have been almoſt totally diſuſed by the moderns.

ALL fractures of the ſkull whatſoever, may be reduced under two general heads.

1. Those in which the broken parts ſtill keep their proper level or equality of ſurface with the reſt of the cranium.

2. Those which do not; or, in other words, fractures with depreſſion, and fractures without.

These two diſtinctions are all that are neceſſary, and will fairly comprehend every violent diviſion of the parts of the ſkull, not made by a cutting inſtrument, from the fineſt capillary fiſſure, up to the moſt complicated fracture; for fiſſures and fractures differ from each other only in the width of the breach, or in the diſtance of the ſeparated parts; and the diſpoſition of the broken pieces, in the large fractures, is ſo various, that diſtinctions and names drawn from thence might be multiplied ad infinitum.

A fracture of the cranium, conſidered abſtractedly, is not ſo dangerous a thing as it is commonly ſuppoſed to be: it is not the breach made in the bone, which produces either the ſymptoms or the hazard; theſe are owing to injury done to other parts. The many inſtances of fractures which have been undiſcovered a great length of time, and of thoſe which, tho' known, have cauſed no ill effects, are ſufficient to evince this.

SUDDEN loſs of ſenſe, and motion, vertigo, coma, convulſion, vomiting, flux of blood from the noſe, or ears, &c. are called the ſymptoms of a fractured ſkull: and true it is, that ſome of them do very frequently attend large wounds, or ſevere blows on the head; but it is as true, that they are ſo far from being the certain, authentic, univo-

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cal ſigns of a breach in a bone, that even where there is a fracture, if there is no depreſſion, theſe ſymptoms ariſe from injury done to other parts, and not from the diviſion of the cranium.

Commotion of the brain, or extravaſation of fluid, either upon, or between the membranes, or in the ventricles, will produce all theſe ſymptoms, when the cranium has ſuffered no kind of harm; and therefore, tho' they are frequently found in caſes where the ſkull is broke, yet do they by no means indicate a fracture.

The doctrine of Celſus has been copied by almoſt all ſucceeding writers, and implicitly believed by almoſt all readers: his words are, " Igitur ubi percuſſa eſt calvaria " protinus requirendum eſt, num " bilem is homo vomuerit, num

" oculi

" oculi ejus obcæcati ſint, num per " nares aureſve ſanguis ei affluxerit, " num conciderit, num ſine ſenſu " quaſi dormiens jacuerit." Theſe words contain a very juſt deſcription of the ſymptoms which frequently attend wounds of the head; but his concluſion, " hæc enim " non niſi oſſe fracto eveniunt," is ſo far from being true, that the ſkull is often broke, and not one of theſe ſymptoms appear; and there are many other injuries to which the head is liable, and which conſtantly produce ſome of them [z].

The fear of removing the ſcalp, and of being diſappointed by not finding a fracture, has been the occaſion of other ſigns or ſymptoms being

[z] Si læſus inſtar dormientis, expers ſenſus deprehendatur; ſi obcæcati fuerint oculi, ſi obmutuerit, ſi bilem vomuerit, ſi animalis inſtar malleo icti conciderit, hæc omnia maximam ac ſubitaneam ſignificant cerebri commotionem, perturbationem, ac concuſſionem; quæ non raro integro manente, nec ulla ex parte rupto cranio, mortem percuſſo adferunt. I PET. PAAW.

ing mentioned by many of the old writers; ſuch as holding a ſilk or horſe-hair tight between the grinding teeth, and making it vibrate by ſtriking upon it; biting a hard body, and attending to the part where the pain is felt, &c. &c. &c. Theſe are called equivocal ſigns, and indeed are ſo truly ſo, as to deſerve no notice at all [a].

All conſiderations alſo which are drawn from the manner in which the wound was given, or received, the kind of weapon or body which inflicted it, the force of the blow, the height of the fall, &c. are all equally fallacious; for every body knows, that very terrible fractures are

[a] Lanfranc talks of ſtriking the head, and attending to the ſound: "Item percutiatur caput cum levi baculo ſicco, "de ſalice, aut de pino, et pone aurem tuam apud caput, "& ſi ſanum eſt, tunc audies ſonum ſanum; ſi fractum, aut "ſciſſum, audies ſonum mutum, ſecundum comparationem "factam a campana ſana, ad campanam ſciſſam," &c. with other ſigns or marks equally abſurd and trifling.

are ſometimes produced by very ſlight blows; and that people often eſcape unhurt from ſuch accidents as ſeem likely to be followed by the moſt terrible conſequence.

In ſhort, nothing but the ſight, and the touch, are to be depended upon; all the ſymptoms, as they are called, are fallacious, but theſe are certain [b].

Therefore, if the integuments are not wounded, or if the wound made in them is too ſmall to admit a proper examination of the bone, and the circumſtances are ſuch as render a view of it neceſſary, a circular piece of the ſcalp ſhould be removed immediately.

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[b] By the touch, I deſire to be underſtood to mean that of the bare bone, having many times experienced the fallacy of feeling thro' the bruiſed ſcalp; a coagulum of blood under which, will ſometimes create ſuch a deception to the fingers, as may, by a perſon who is either inattentive, or not much verſed in theſe things, be miſtaken for a fracture with depreſſion.

If there is no wound, the point ſtruck ſhould be made the center of the inciſion; if there is a wound, that wound ſhould be the central point; and in both caſes, the piece removed ſhould be of ſuch ſize as to bring all that part of the bone into ſight, which is ſuppoſed to be injured; and to admit the application of the trephine, if it is found neceſſary.

If the ſcalp is ſo wounded as to detect the fracture, the courſe of it will direct the inciſion; and if it is much bruiſed, it will always be adviſeable to take away the greateſt part of what is ſo bruiſed; for the removal will very little protract the cure, if every thing elſe ſucceeds happily; and the leaving it on, in ſuch circumſtances, may be attended with both pain and trouble in future.

In ſcalping, the knife ſhould be held in ſuch manner, as to cut perpendicularly down to the ſkull, thro' the ſkin, and pericranium at the ſame time, that the portion of each may be equal.

It is hardly neceſſary to inſert a caution againſt preſſing too hard with the ſcalping knife, in large fractures, with looſe pieces, the danger is ſo obvious; and it is as apparent, that there is but one way of avoiding the danger, which is by extending the inciſion ſo far beyond the broken parts, as to cut upon a firm, ſtable part of the ſkull: by this means, there will not only be leſs riſk of hurting the membranes and brain, but the whole miſchief will be more fairly and clearly brought into view; a thing which, ſooner or later, muſt be done, and is always beſt done at firſt, be-

fore the parts are inflamed, or the patient feveriſh. No part of the ſcalp ſhould ever be wantonly, or unneceſſarily, cut away; but, on the other hand, it ſhould always be remembered, that this operation is performed with intention to bring, if poſſible, the whole fracture into view; and whatever falls ſhort of that, where it is practicable, is wrong, not only as it does not anſwer the purpoſe for which it is intended, but as it generally puts the patient under a neceſſity of undergoing the ſame pain and trouble again.

When the ſcalp is bruiſed, or wounded, ſuch wound or bruiſe, points out the place from whence the piece ſhould be removed, in order to examine the bone: but all the antient, and many of the modern writers, ſpeak of a kind of

fracture in which the ſcalp is uninjured, called counter-fiſſure.

This has formerly been the ſubject of much litigation and controverſy; the whole of which amounts to no more than this, that the cranium has ſometimes been found cracked on the part oppoſite to that which ſeemed to have received the blow; and therefore, if the ſymptoms make it probable that the ſkull is broke, and no fracture is diſcovered, under the part ſtruck, or wounded, the ſcalp ſhould be removed from the part oppoſite, to ſee if there is one there.

Now, not to mention the great difficulty of determining this, or of knowing certainly, when a man falls from on high, or is knocked down by a ponderous body, which was the part firſt ſtruck; or whether the blow, or the fall, produ-

ced the fracture; I ſay, not to mention theſe, and other difficulties attending ſuch enquiry, it can be of no poſſible uſe in practice: for if there are ſuch ſymptoms as induce the ſurgeon to think that the ſkull is broke, he will certainly examine the whole head carefully; if there are any external marks ſufficient to authorize the removal of the ſcalp, he will make his inciſion where ſuch mark indicates; and if, by this means, a fiſſure, or fracture, is diſcovered, the method of treating it is not at all altered by the manner of its production.

On the other hand, if the ſymptoms are only general, and there is no external direction where to make an inciſion, I cannot, notwithſtanding all that has been wrote upon the ſubject, think myſelf authorized to cut away a part of the ſcalp, in or-

der to hunt for a counter-fiſſure, which it is ten to one if I find.

Indeed if there were any certain, unerring ſigns of a fractured cranium, the caſe would be different; the appearance of theſe would prove that there was a fracture ſomewhere, and we ſhould thereby be authorized in ſearching for it: but I have already taken notice, that all the ſigns are equivocal, and that tho' they are often found in perſons, whoſe ſkulls are broke; yet as they are not cauſed by the fracture, they do not indicate its exiſtence.

No clearer proof of the truth of this need be ſought for, than what may be drawn from the chirurgical method of treating theſe caſes; for as the ſymptoms are not cauſed by the breach made in the bone, ſo neither is the trephine applied, nor any other means made uſe of, in or-

der to procure a reunion of it. The ſymptoms attending theſe caſes ariſe from injury done to other parts; and to the relief of theſe, all our helps are, or ſhould be, adminiſtred.

These injuries are commotion, or diſturbance of the medullary part of the brain; extravaſation of blood, or ſerum; inflammation or ſuppuration of the dura mater; ſome or all of which may, and generally do, attend fractures of the ſkull, and are the cauſes of the ſymptoms, the hazard, and the neceſſity of perforation.

Previous to the directions for the proper management of fiſſures, and ſimple (that is, undepreſſed) fractures, it may not be amiſs to inquire into the opinions of our forefathers in theſe caſes; to take a ſhort view of their intention and conduct;

conduct; to ſee in what we differ from them, and whether the difference is well grounded, and to our advantage; it being neither antiquity, nor novelty, but utility alone, which conſtitutes chirurgical merit.

When a fiſſure paſſes both tables of the ſkull, we generally, upon removing it, find a line, or ſtreak of blood, upon the ſurface of the dura mater, more or leſs in quantity, but exactly correſpondent to the track of the fiſſure.

This is ſometimes the conſequence of a breach of ſome of the ſmall veſſels which connect the dura mater to the inſide of the ſkull, but is more often ſhed from the torn veſſels of the diploe.

The antients, in general, believed that this blood did, by confinement, become corrupt and putrid; that it degenerated into matter, and contributed

tributed largely to thoſe collections which are ſo frequently found in theſe caſes.

When a fracture has either not been diſcovered, or the bone not perforated until ſome days after the accident, and the patient begins to be feveriſh, upon removing a piece of the cranium, the dura mater is moſt frequently found in a ſloughy, or purulent ſtate.

This our forefathers ſuppoſed to be the effect of a corroſive ſanies, which dropped down from the edges of the fracture, and lodging upon the membrane, ſpoiled its texture, and rendered it foul.

Many of them alſo were perfectly well acquainted with the ſeceſſion of the inflamed dura mater, and the abſceſſes in conſequence thereof; but ſtill they ſuppoſed the matter to have been originally putrefied blood.

THESE things being taken for granted, they acted accordingly; their intention, in the firſt inſtance, was directed to the removal of the extravaſated blood; in the ſecond, to the defence of the membrane againſt the dripping ſanies; and in the third, to the diſcharge of matter.

IN order to accompliſh the firſt, they inlarged the fiſſure by the abraſion of its edges with ſcalpra of various ſhapes and ſizes; the ſecond, they aimed at, by means of ſindons, or other dreſſings, applied cloſe to the membrane, under the edges of the fracture; and the third, by the removal of a larger piece of the ſkull.

HOWEVER accurate the antients were in the obſervance of effects and appearances, they were often wrong in aſſigning cauſes; of which

which the preſent caſe is an inſtance: for the coagulated blood, found under a fiſſure, does never become matter, neither does the ſanies dropping from the edges of the broken bone, produce the ſloughy ſtate of the dura mater.

If blood is ſhed upon that membrane, between it and the ſkull, it will moſt probably do miſchief; but what miſchief it does, it will do mechanically, merely by its preſſure, without any tendency to putrefaction; and, if it is ſuffered to continue in that ſituation, may prove fatal, without undergoing any change, remaining ſtill a mere coagulum of blood, unaltered, and indeed incapable of ſuch alteration as is ſuppoſed.

All the ſymptoms attending ſuch extravaſation are proofs of this: they are all ſuch as ariſe from preſſure made

made on the brain; and are, according to the quantity and ſituation of the extravaſated fluid, greater or leſs, from the ſlighteſt vertigo, up to the moſt lethargic inſenſibility.

THE cauſe aſſigned for the putrid, ſloughy ſtate of the dura mater, viz. the dripping ſanies, is equally wrong.

THIS is a cauſe very unequal to ſuch an effect; an effect which can only be accounted for by the detachment, and inflammation of that membrane, produced by the force of the blow, at the time of the accident.

THE nature of the ſymptoms, the time of their acceſs, the concomitant fever, the ſtate of the parts when examined, and the general event, all prove this, as will more fully appear, if what was ſaid in the preceding ſection, be transfered hither: the fracture makes no difference

rence with regard to the membrane; and the caſes are ſo far exactly parallel; for whether the bone be broke or not, the detachment of the dura mater, from the inſide of the ſkull, is occaſioned by violence done to its connecting veſſels; and the inflammation, and putrefaction of it, being the conſequence of ſuch detachment merely, may equally attend a ſound or a broken bone.

Now whether the caſe be of the firſt ſort, and blood is to be let out; or of the latter, and matter is to be diſcharged, the method of doing either of them, by ſcalpra or rugines, is liable to many objections; it is irkſome and hazardous to the patient, tedious to the operator, and often unequal to the intention.

That by the uſe of ſuch kind of inſtrument, the opening of a fiſſure may be inlarged, is beyond all doubt;

doubt; but if it is of any conſiderable length or ſize, it is a very operoſe method; it jars and ſhakes the head immoderately, is attended with danger, if done unſkilfully, or inattentively, and when finiſhed cannot ſerve all the purpoſes for which it ſhould be deſigned, as it will neither remove enough of the cranium, nor lay bare a ſufficient portion of the dura mater, in caſes where the extravaſation is large, or the inflammation extenſive.

Of this themſelves were ſenſible; for if the fracture was of ſuch ſize, or ſo circumſtanced, that the ſcalpra abraſoria were deemed improper; or if the accident was attended with ſuch a degree of contuſion, as to render it moſt probable, that the parts underneath were much injured; they did not depend upon ſcraping away the edges of the fiſ-

ſure,

ſure, but endeavoured to remove a large piece of the ſkull [c]. This was effected by means of ſeveral different inſtruments, according to the circumſtances of the caſe, or the humour of the operator: terebræ and terebellæ of various ſorts and ſizes; the cycliſcos, or ſcalper exciſorius, and the modiolus [d]; all which, as they were then made and uſed, were ſubject to great inconveniences, ariſing partly from their form, and partly from the inartificial manner in which they were applied.

If

[c] "Ex fracturis vero quæ ad cerebri membranas uſque "pervanerunt, ſi ſimplex tantum fractura ſit, anguſtis "ſcalpris utendum; ſin cum contuſione aliqua, quod con-"tuſum eſt excidi debebit; idque vel terebellis prius in "circuitum foratum ac mox ſcalpris admotis, vel protinus "ab initio cycliſcis." GALEN.

In iis que uſque ad cerebri membranam diviſa ſint, ſi ſola rima ſit, iiſdem radulis utendum; ſi colliſio aliqua una ſit, terebris excindere colliſum oportet, ſcalpris adhibitis. ORIBASIUS.

[d] Figures of which are to be ſeen in many of the old books, in Albucaſis, Andreas a Cruce, Fabritius ab Aquapendente, Guido, Lanfranc, Sculteti, Hildanus, Berengarius; and in Peter Paaw's comment upon Hippocrates de vulneribus capitis.

If the piece intended to be removed was larger than could be comprehended within the modiolus, the operation was performed by means of terebræ; and was, like that of the ſcalprum, painful, tedious, and hazardous [e].

The piece to be taken away was ſurrounded with perforations, made at ſmall diſtances from each other; and then, in ſome caſes, the ſcalper exciſorius or cycliſcos; in others, the ſcalprum lenticulatum was introduced, and, being ſtruck with a mallet, cut thro' the interſpaces between each perforation: by this means, the portion of bone, ſo ſurrounded, was removed, and the dura mater laid bare [f].

The

[e] At ſi latius eſt vitium quam ut illo (modiolo) comprehendatur, terebra res agenda eſt. Celsus.

[f] The following paſſages, from Oribaſius and Celſus, may ſerve to give us a clear idea of the whole proceſs.

" Miniſtri

THE terebræ, terebellæ, or trypanæ, (for all theſe names are ſometimes given to the ſame kind of inſtrument) were various, both in form

" Miniſtri juxta aſſideant, quorum unus caput læſi con-
" tineat, alter opportuna miniſterio faciat; auriuin foramina
" lana coacta obturanda ſunt, ne ſonitu in exſectione ter-
" reatur; his factis infigendus calvariæ eſt mucro acutus
" terebræ, qua læſum os colorem immutavit, juxta inte-
" grum, deinde lente habena terebram convertere debe-
" mus, donec inciſo oſſi mucro inſiſtat, ac tum citatius
" circumagere oportet habena terebram convertente, donec
" mucro in ſpatium inter duplex os deſcendat; ubi autem
" foramen altius adactum ſit, ultra craſſitudinem ſpatii
" inter duplicem teſtam oſſis quod perforatur, tum terebra
" multo circumſpectius convertenda eſt, ne repente de-
" ſcendens, cerebri membranam violet.

" Cum jam terebra adacta fuerit, et vel conjectura de-
" prehendatur totam oſſis craſſitudinem eſſe perforatam,
" vel perparum ſolidæ ſedis infra relictum, tunc is qui
" operatur altitudinem deguſtet, demiſſa tenuis acus obtuſa
" parte, ac ſi quid continuæ ſedis etiam reliquum ſit, de-
" primendus altius terebræ mucro eſt, eaque lente circum-
" acta, ſolidum os perforandum, eadem quaque faci-
" enda eſt in aliis foraminibus, donec rima in ambitu
" perforata ſit. Septa vero media, inter foramina fatis
" habent ſpatii fere quantum ſpecilli anguſti averſa pars eſt.
" Factis foraminibus ad exciſionem quæ dicitur venien-
" dum eſt; ut excifis tum foraminibus, tum mediis, læſa
" oſſa removeantur. ORIBASIUS.

" Ea (terebra) foramen ſit in ipſo fine oſſis vitioſi, atque
" integri; deinde alterum non ita longe, tertiumque, donec
" totus is locus qui excidendus eſt his cavis cinctus eſt,
" tum exciſiorius ſcalper ab altero foramine ad alterum.
" Malleolo adactus, id quod inter utrumque medium eſt
" excidit." CELSUS.

form and ſize; but may be reduced to three principal ones.

1. One, which was much like to our common carpenters or coopers auger, which is turned by the hand, while one extremity reſts on the bone, and the other is kept ſteady by the chin or breaſt of the operator.

2. One, which is turned by a croſs-bar and double fillet; "tere-"bra quæ duplici habena vertitur," ſuch as is in uſe among the ſmiths, and workers in copper, and is called a drill.

3. One, upon the ſame principle as the ſecond, but turned by a ſtrung bow, "terebra que arcu ver-"titur," like what is uſed by our watchmakers, and many other artificers; figures of all which are to be ſeen in Vidus Vidius's Commen-

tary on Hippocrates, in Andreas a Cruce, and others.

The tedioufneſs which attended the making ſo many perforations, the diſturbance given to the patient's head, as well by the terebra as by the mallet and chizel [z], the hazard of wounding the membranes, and brain, notwithſtanding the uſe of the meningophilax, and the coarſeneſs and unhandineſs of the whole proceſs, are too obvious to need a comment.

Of this all the beſt practitioners were perfectly ſenſible; they felt the inconveniences, and dreaded the danger.

They found, that they very often wounded the dura mater, and ſometimes

z "Quod vero per cycliſcos opus adminiſtratur, ne id quidem omnino vitio caret, quum quatiat immodice caput, quod potius quietem poſtulat." Galen.
"Sæpe ſcalpros pulſantes, adeo ut totum cerebrum supermoveatur." Galen.

times the brain [h]; and therefore uſed all the precaution which ſuch accidents ſuggeſted to them. In ſome inſtances, they adviſe the perforations to be made not quite thro' the bone, but to leave a thin lamina of it intire [i]; in others, tho' the perforations are made quite thro', they direct the piece of bone to be left adherent, for two or three days to the membrane, leſt the latter ſhould be hurt by a ſudden or violent ſeparation of them.

THE cautions laid down by Hippocrates, Galen, and others, concerning the part of the bone whereon to apply the inſtrument, and the great

[h] "At quæ per terebellam quidem ratio ſungitur parum tuta eſt, propterea quod dum audacius eam tractant, duram membranam non raro violant. GALEN.

[i] "Si a principio morbi curam per mediolum adgreſſus fueris, non ſtatim oportet os ad membranam uſque perforare, verum quando in eo eſt ut parum abſit quin totum os penetraverit, et os ipſum moveri jam incipiet, ab operatione deſiſtere." HIPPOCRATES.

attention which they admoniſh the operator to pay to its execution [k], all proceed from the ſame fear.

For this reaſon alſo, many of them endeavoured to furniſh their perforating inſtruments with ſuch guards, or defences, as ſhould prevent them from going too deep[l]. In Albu-

[k] "Cavere oportet ut in terebellæ admotione ne falleris, verum qua parte craſſiſſimum os eſſe viſum fuerit in eam ſemper terebellam admotam adigito."

HIPPOCRATES.

"Verum quod excidi oportet id totum cycliſcis nudandum non eſt, ſed ea maxime ex parte qua fractura eſt graviſſima, nam præter alia, etiam membrana ipſa ab oſſibus quæ vehementer ſunt afflicta, recedit celerrime," which laſt words plainly prove how clear and perfect an idea the author (Galen) had of the detachment and inflammation of the dura mater in conſequence of external violence.

"Terebellis autem ipſis ut mergi non poſſunt, parum ſupra cûſpidem nonnulli ſupercilium extans efficiunt."

GALEN.

"At ſæpe accidit, ut terebræ repente adactæ, ob naturalem perforatorum oſſium debilitatem, vel tenuitatem, membranam ſauciarent." ORIBASIUS.

[l] "At quia dum terebrum hoc circumagitur, periculum imminet ne membranæ ledantur; ideo nonnulli, ut quo minus aberrarent et hoc periculi genus evitarent, terebras excogitarunt quæ mergi non poſſunt, et ob id a græcis abaptiſta dicuntur." ANDREAS a CRUCE.

"Si os autem eſt forte durum, tunc oportet ut perfores in circuitu ejus, antequam tu adminiſtres inciſoria cum terebris,

Albucaſis, Andreas a Cruce, and others, are found figures and deſcriptions of "modioli duabus vel "quatuor alis muniti," of ſome called abaptiſta, of others called meſpilati and torculati, and of terebellæ ſo guarded as not to be capable of paſſing thro' both tables, or at leaſt not intended ſo to do [m].

But whoever will conſider the very different thickneſs of different ſkulls, and of different parts of the ſame ſkull, will eaſily ſee how little dependance is to be made on ſuch defences, and how hazardous

"terebris, quæ nominantur terebra non profundantia; et "non nominantur ita, niſi quoniam ipſa non pertranſeunt "terminum oſſis carnei, ad illud quod ut poſt ipſum; "propterea quod terebro eſt extremitas rotunda, ſuper illud "quod eſt ſub capite ejus acuto, ſimilis margini, et circu-"lus parvus prohibet ſubmergi, et pertranſire ſpiſſitudi-"nem oſſis. Et convenit tibi ut accipias ex iſtis terebris "numerum multum, quorum unum quodque conveniat "quantitati ſpiſſitudinis oſſis, donec preſens ſit tibi omni "cranio terebrum, &c." Albucasis.

[m] Expedit itaque id genus complures preparatas habere, ad omnem calvariæ craſſitudinem. Galen.

the uſe of ſuch Inſtruments muſt prove.

In ſhort, from an attentive conſideration of the doctrine and practice of the antients, in this part of ſurgery, it will appear, that their obſervations of the ſymptoms, and appearances of the diſeaſed parts, were in general extreamly juſt and accurate; that their curative intentions were very proper; but that their inſtruments, by being extreamly aukward, and unmanageable, prevented them, in ſome caſes, from obtaining their propoſed end, and, in others, were the occaſion of much miſchief.

Reduction of the number, and ſimplicity in the form of our inſtruments, is one of the merits of modern ſurgery.

The preſent practitioners have, in this as well as ſome other parts of the

the art, laid aſide many uſeleſs, or at leaſt unneceſſary ones, and have brought thoſe which they ſtill retain, to ſuch plainneſs, that no future miſchief can properly be ſet to their account. A trephine, an elevator, and ſometimes a pair of forceps, are all the inſtruments now in general uſe; and theſe are ſo made, as to be manageable by the hand of any judicious man, with the moſt perfect ſecurity.

To thoſe who are not very converſant in, or have not thought much about theſe things, (and for whoſe uſe theſe papers are principally deſigned) it may not be amiſs to explain, in few words, what is intended by perforating the ſkull, in the caſe of a ſimple fracture; with what view, and for what purpoſe, it ought to be done; and what ſuc-

ceſs

ceſs may moſt probably be expected from it.

It has already, in the courſe of this work, been remarked, that ſome of the ills attending ſevere blows on the head produce their ſymptoms immediately, and require immediate aſſiſtance; and that there were others which, though really occaſioned by the blow, yet did not ſhew themſelves, until ſome days were paſt.

Of the firſt kind, are all thoſe which produce immediate preſſure on the brain; ſuch as extravaſation of blood upon, or between, the membranes; and fractures with depreſſion.

Of the latter, are gradual, limpid extravaſation; and inflammation of the ſeparated dura mater.

A FISSURE, or a ſimple fracture, may be attended with all theſe, except

cept depreſſed bone; and moſt frequently is with ſome: and hence ariſe what are improperly called the ſymptoms of it. A quantity of blood may be ſhed from its veſſels, and bring on immediate bad ſymptoms; or the dura mater may be ſo hurt by the blow, as to ſeparate, inflame, and in due time produce matter.

PERFORATION of the cranium is neceſſary in both. In the former, it is immediately ſo; for the relief of urgent ſymptoms, and imminent danger: in the latter as a preventative, or with deſign to obviate ſuch inconveniences as would moſt probably follow, if ſuch care was not taken.

Now, tho' the ſymptoms give the alarm much ſooner in the former caſe, yet the neceſſity of the operation is full as great in the latter; for neither

ther matter nor blood can be diſcharged from under the cranium, without perforation; nor can either of them be ſuffered to remain there, with ſafety to the patient.

And thus the truth of what was aſſerted, at the beginning of this ſection, is evinced; viz. that the chirurgical method of treating fiſſures, and ſimple fractures of the ſkull, by having no tendency towards procuring a reunion of the broken bone, proves that it is deſigned to relieve, or obviate ills not ariſing from the fracture, but from miſchief done to other parts; than which nothing can be more plain: for the trephine, inſtead of leſſening, inlarges the breach; and if there was neither extravaſation of fluid, ſeparation of membrane, nor any other injury beſide the mere

crack

crack in the bone, would be uſeleſs, and therefore wrong.

But as it very ſeldom happens, but that either blood is extravaſated, which requires immediate aſſiſtance; or the dura mater is injured, which, if not very early taken care of, ſeldom admits of relief: therefore the operation of the trephine is, in general, abſolutely neceſſary; if not for the removal of immediate bad ſymptoms, yet as the moſt probable means in our power to prevent ſuch as moſt frequently follow if it is neglected.

The chirurgical intention therefore in ſimple fractures is, to make ſuch an opening in the cranium as ſhall give immediate diſcharge to extravaſated blood, if there is any underneath it; or, by means of the ſame opening, to obviate, or remove if poſſible, the evils flowing from an in-

inflamed, or putrid ſtate of the dura mater.

For theſe reaſons, the trephine ſhould always be ſet on in ſuch manner, as that the fiſſure ſhould traverſe the circle made by the ſaw, where it is poſſible; or, at leaſt, the ſaw ſhould always comprehend the breach in the bone.

I am aware that the direction given by ſome of the old writers of great character, is very different. Among theſe, Fab. ab Aquapendente is very particular[n]; but notwithſtanding theſe authorities, the comprehenſion of both edges of the fracture within the circle of the ſaw, is ſo neceſſary, and attended with ſuch

[n] "His conſideratis in latere ipſius rimæ interpoſito "digiti ſpatio apponimus modiolum."

And in another place, "Tum muſculus modiolus fi-"gendus ad rimæ ſeu fracturæ latera eſt tam diſtans a "rima ut ipſam non attingat comprehendatque mo-"dioli ora." Fabritius ab Aquapend.

ſuch manifeſt advantages, that I muſt again inculcate a conſtant attention to it.

The ſaw or crown, as it is called, of the trephine, ſhould never be ſmall, eſpecially if the patient is adult; a circumſtance which I think neceſſary to mention, as the inſtrument-makers, if not forbid, are apt to make them ſo.

The appearance of the membrane, and the other circumſtances attending the caſe, will determine whether one perforation is ſufficient, or whether more are neceſſary.

If the trephine was applied for a bloody extravaſation attending a fiſſure, and ſuch diſcharge is made by the firſt perforation as to remove the ſymptoms; a repetition may poſſibly be unneceſſary. But if the firſt opening diſcovers a lodgment of coagulated blood, but yet does not

not relieve it, and the ſymptoms ſtill continue; it muſt be repeated again and again, along the whole tract of the fiſſure; ſtill obſerving the caution, of keeping the breach of the bone within the circle of the ſaw.

If there are no immediate bad ſymptoms, and the trephine is applied as a preventative; one, or two, according to the length of the fiſſure, may be ſufficient at firſt: and if more are neceſſary, the future ſymptoms, and appearances, will indicate it. But if the operation is not performed until ſome days are paſt, and the ſymptomatic fever, in conſequence of injury done to the dura mater, is begun; the ſloughy or purulent appearance of that membrane will authorize, and fully vindicate, the free uſe of the inſtrument. The operation is neither painful, nor hazardous; and, in theſe circumſtances,

ces, can do good only by being freely adminiſtred.

In this ſtate, the great, and indeed almoſt the only object of conſideration is, the extent of the ſeparated or diſeaſed part of the dura mater. This is what will moſt probably determine the patient's ſafety, or danger; and by this muſt our conduct be regulated.

In the two inſtances already mentioned, of extravaſation of a ſmall quantity of blood immediately under the fiſſure, and of ſimple fracture not attended by any bad ſymptoms, the application of a ſmall trephine merely along the tract of the fiſſure may be ſufficient; in one, for the diſcharge of the blood; in the other, to prevent a lodgment of matter, if any ſhould be formed. But in the preſent inſtance, where the dura mater is injured to ſome

extent, the ſymptomatic fever begun, and matter, or ſloughs forming, the one, only hope of relief muſt ariſe, from denuding a large portion of the ſurface of that membrane. Nothing but this can do any ſervice; nor can this be done too ſoon, as muſt appear to every one who will conſider the tendinous ſtructure of the dura mater; the tenſion which ariſes when it is inflamed; its confinement within the cranium; and the part it almoſt immediately inveſts.

It is indeed no eaſy matter to determine, with any great degree of preciſion, the extent of the injury done to this membrane; the concealment of it within the ſkull prevents our knowing this, with ſo much certainty as might be wiſhed: but ſtill I think there are ſome appearances, both before and after perforation,

foration, from which ſome kind of information is to be obtained.

For example; if, upon ſcalping, the pericranium is found altered, and detached from the ſurface of the cranium; or if, ſome days after the ſcalp has been removed, the edges of the ſore quit their adheſion to the bone, and become ill-conditioned; or if the denuded ſkull ſuffers apparent alteration of colour; from any of theſe circumſtances, we may moſt reaſonably preſume that the dura mater is injured; that is, ſeparated, and inflamed: and this preſumption may take place before the operation is performed. But if, added to theſe appearances, before the inſtrument is ſet on, we find, upon perforating the bone, that the dura mater is plainly detached from it, or is altered from its natural, bright, tendinous colour, or is purulent,

rulent, or ſloughy; the caſe becomes but too clear, and muſt be treated accordingly: that is, by laying bare ſo large a part of the ſurface of that membrane, as to give way to its inflammatory tenſion, and allow a free diſcharge for gleet, matter, &c. this may ſometimes produce good effect; and nothing without this can.

I have already endeavoured to explain the ſufficiency of inlarging a fiſſure, by the abraſion of its edges with ſcalpra, or rugines, according to the cuſtom of our anceſtors. The objection made to it was, that it did not remove enough of the cranium, for the relief of the inflamed dura mater; by which means, that membrane preſſed againſt the inſide of the ſkull, matter was not diſcharged with the freedom it ought, and the ſymptoms were not leſſened, or at leaſt not removed.

So

So alſo, in the preſent practice: if in the caſe of extenſive ſeparation, or inflammation of the dura mater, the ſurgeon contents himſelf with the application of a ſmall crowned trephine, along the tract of the fiſſure only, he will, in general, be diſappointed, and for the ſame reaſons.

The only method of obviating this inconvenience is, either to uſe an inſtrument, whoſe circle is ſo large as to anſwer the proper purpoſe by a few applications; or elſe, to uſe a ſmall one, in the ſame manner the antients did their terebellæ; that is, to perforate all round the piece intended to be removed, and thereby lay bare a large portion of the membrane.

Whatever are the means uſed, this is the end which ſhould be aimed at; as it is from this, principally,

that relief can be expected. Whatever degree of hazard may be ſuppoſed to be incurred, by expoſing the dura mater to the air, can hardly be increaſed by the largeneſs of the opening: and if we put our patients to any riſque at all, it ſhould certainly be with a proſpect of greater good.

Some very eminent practitioners, both antient and modern, obſerving that fiſſures, and ſimple fractures of the cranium, have ſometimes lain concealed a long while, without doing miſchief; and, at other times, have never produced any bad ſymptoms, or at all affected the patient's health; have oppoſed the uſe of the trephine, ſcalprum, or any other inſtrument; and have adviſed the leaving the local injury to nature, and a ſuperficial dreſſing; depending ſolely on evacuation, and regimen, for a cure.

The

THE obſervation, on which this advice is built, has certainly ſome foundation in truth: it does now and then happen, that neither extravaſation of blood, nor ſeparation of the dura mater, attend a ſimple fracture; and, in perſons of very good habit, they will ſometimes do well, with little or no chirurgical aſſiſtance.

SEVERAL inſtances of this have been met with; and was it in our power to know with certainty, when the miſchief was of this ſimple kind, the operation might ſometimes be omitted *. But unfortunately the

* The two different ſtates of penetrating fiſſures, as far as relates to the ſafety, or injury of the dura mater, was perfectly well known to ſeveral of the antients: among the reſt, Paulus Ægineta has given a very particular and juſt deſcription of both.

" Si ad cerebri membranam uſque pervenerit fractura, " non rademus, ſed agnoſcere conabimur utrum mem- " brana ab oſſe receſſerit, an afflixa permaneat. Si enim " ipſa manet, inflammatio nulla infeſtat vulnus, æger " paulatim febri liberatur; et pus coctum apparet. Si re-

" ceſſerit

ſymptoms of that ſort of injury, which produces thoſe fatal collections of matter found between the dura mater and the ſkull, do not appear at firſt; and when they do, it is ſo very often too late to do any good, that a general rule, to apply the inſtrument indiſcriminately to all penetrating fiſſures, would, in all probability, ſave many lives, which are loſt

" ceſſerit membrana, augentur dolores, et febris ſimili-
" ter, os olium ſumit colorem, pus tenue et crudum effer-
" tur; et ſi medicus negligentius rem tractet, nec perfora-
" tione utetur, hoc graviora ſymptomata aboriuntur;
" nempe bilis vomitus, convulſio, mentis delirium, et fe-
" bris acuta. PAULUS ÆGIN.

" Dico debet dari ſignum fracturæ, a qua removeatur
" panniculus groſſus in primo debes ſcire diſpoſitionem
" ſyphac, utrum eſt adhærens an non; videlicet, ſi ad-
" hæſerit oſſi, non fiet in vulnere apoſtema calidum; et
" licet accidit, modicum erit, rugo manabit de eo mo-
" dica, et putredo erit digeſta.

" Sed ſi fuerit remotum, vehementiores erunt dolores et
" febres, mutabitur color oſſis, et corrumpetur, et manabit
" de eo putredo tenuis." RHASES.

" Si rima in ſuperficie ſit, cerebris membrana non ab-
" cedente, curatio eadem adhibeatur quæ ad os nudatum
" demonſtrata eſt. Cerebri vero membrana abcedente, et
" humore ibi collecto, poſt primos curationis dies ad tere-
" bram properandum eſt. ORIBASIUS.

loſt by neglecting it. And tho' perhaps it might, in ſome few inſtances, add a little unneceſſary trouble to the patient; yet, if judiciouſly performed, it cannot (I think) ever add to his hazard; on the contrary, it will moſt frequently leſſen it.

I would not be underſtood to mean, that I think the laying the dura mater bare, to the contact of the air, a thing of indifference; and that no miſchief can ariſe from thence: this is a point, concerning which, many able men have differed, and about which, I am by no means ſatisfied; but I think, I can venture to ſay, what is fully to the preſent purpoſe, viz. that inlarging a fracture by the trephine, will not produce any riſque, additional to that of the fracture.

The breach made in the bone, has already let in the air upon the mem-

membrane, therefore that conſideration is at an end; and the point in diſpute is, whether, upon a ſuppoſition, that the dura mater may poſſibly not be ſo injured, as to inflame, (the patient being at firſt free from any bad ſymptoms) the operation ſhould be deferred while it might be of ſervice, as a preventative, until ſuch complaints ariſe, as indicate the neceſſity of performing it; at which time it is generally too late to do any good.

I know that Hildanus, Wiſeman, and ſome other great practitioners, have been of opinion, that fiſſures, tho' they do paſs through both tables, yet if they are not attended by any bad ſymptoms, may be let alone. The authority of theſe gentlemen is certainly of weight; but on the other hand, it ſhould be conſidered, that extravaſation of blood,

was the great, if not the only object of their conſideration, in ſimple, undepreſſed fractures: this they looked upon, as the cauſe both of the early, and the late ſymptoms, conſidering it either as coagulated, or as putrefied; and therefore, when there was no ſymptom of ſuch extravaſation, they did not ſee any neceſſity of perforating the cranium.

But had they conceived rightly of the univerſal adheſion of the dura mater to the ſkull; and had they carefully attended to the conſequences of its being detached, and inflamed; I am inclined to believe, that they would not have thought of leaving penetrating fiſſures to nature [p] unaſſiſted by art.

In

[p] This doctrine of leaving penetrating fiſſures to an external, ſuperficial application only, is of antient date, and is particularly mentioned by Celſus; who has added ſo accurate a deſcription of the different ſtates of the patient, and of the appearances of the ſore, under the different

In ſuch points as theſe, every man muſt be determined from his own judgment and experience; for my own part, the number of thoſe in whom the membrane is injured, ſeems to me, ſo greatly to exceed that of thoſe, in whom it eſcapes unhurt,

rent circumſtances of hurt, or unhurt membrane, as to be extreamly well worth attending to.

" In omni vero fiſſo fractove oſſe protinus antiquiores " medici ad ferramenta veniebant, quibus id exciderent; " ſed multo melius eſt, ante emplaſtra experire quæ cal- " variæ cauſa componuntur, &c.

" Si caruncula increſcere cæperit, et febricula aut ſoluta " fuerit aut levior, et cupiditas cibi reverterit, ſatiſque ſom- " ni accedat, in eodem medicamento perſeverandum eſt: " hac ratione rimæ ſæpe callo implentur.

" Si vero prima ſub curatione febris intenditur, breveſ- " que ſomni et iidem per ſomnia tumultuoſi ſunt, ulcus " madet neque alitur, et in cervicibus glandulæ oriuntur, " magni dolores ſunt, cibique ſuper hæc faſtidium increſcit, " tum demum ad manum ſcalprumque veniendum eſt." To which he might have added, that it was then very often too late to do any ſervice.

Hippocrates, the moſt careful obſerver, and moſt faithful relater of appearances, was clearly of opinion, that ſome degree of contuſion generally attended fiſſures, however fine; as appears from many paſſages. " Quodcunque telum os " findit, idem illud etiam contundit magis vel minus. —Ri- " mæ quoque contuſionem comitem eſſe omnino neceſſe eſt, " vel magis vel minus," &c. And daily experience will convince all who will obſerve, that the great miſchief attending capillary fiſſures is, from the effect of contuſion; and that very few eſcape feeling ſuch effects.

unhurt, that I ſhould very ſeldom, if ever, omit the operation.

When I ſay this, I deſire to be underſtood to mean, that I ſhould perform it immediately, as ſoon as the accident had happened; and that I ſhould do ſo, with intention to obviate or prevent the ills ariſing from the injured membrane.

But if I did not ſee the patient until ſeveral days were paſt, and found him then perfectly free from every ſymptom of miſchief, I ſhould not think the reaſons for perforation altogether ſo cogent; but being guarded by a proper prognoſtic, and having informed thoſe concerned, of the general inefficacy of late aſſiſtance; I ſhould wait till ſome further indication aroſe, moſt ſincerely wiſhing that none might ariſe, for reaſons already given.

HITHERTO I have conſidered the fiſſure as being apparent, by an original wound of the ſcalp; or brought into view, by the removal of it ſoon after the accident; in both which caſes it is known early.

BUT it ſometimes happens, that tho' the bone is cracked, and the dura mater ſo injured as to inflame in due time, yet there being at firſt no ſymptom, either of extravaſation, or commotion, and the integuments being neither wounded, nor apparently bruiſed, no notice is taken of the accident.

IN this caſe, after ſome days (very uncertain as to number) the patient feels himſelf languid, and out of order; is chilly, and hot, by turns; is reſtleſs, and complains of a dull kind of pain in his head; ſoon after this, the ſcalp begins to ſwell, and become puffy, in the

place

place where the blow was ſtruck; this appearance is accompanied by the ſymptomatic fever, which is ſoon ſo heightned as to require attention.

If the ſcalp be now divided, the pericranium is found firmly united with it, but detached from the ſkull the whole length of the fiſſure, and to a much greater breadth; very much altered in colour, being now of a blackiſh, or livid hue; and containing, between it and the bone, a ſmall quantity of a brown, thin ichor [q].

According to the date of the injury, the ſymptoms are more or leſs urgent; at firſt, it is rather a reſtleſneſs and inquietude, than any great degree

[q] Oſſium rima occulta interdum non ante ſeptimum diem, decimum quartum interdum, interdum ſerius, ſe oſtendit; tum caro ab oſſe abcedit, tumque os lividum apparet, dolores item ichorum diffluentium excitantur: atque hæc talia difficulter remediis cedunt. Hippocrat. Coac.

degree of fever, tho' always attended with a hard, jarring pulſe; but in proportion, as the membrane inflames, and tends to putrefaction, every thing is exaſperated; the pain is greater, the fever higher, the patient gets little or no ſleep, is frequently ſhook by rigors, and in ſhort, ſuffers all that has been deſcribed at large in the ſloughy ſtate of the dura mater from contuſion; concerning which, enough has already been ſaid to prove, that in this ſtate there can be no hopes of relief, but from perforation of the bone.

It ſometimes happens alſo, that a fine capillary fiſſure runs under the undivided part of the ſcalp, from ſome part of a larger fracture, and eſcapes unnoticed for ſome days.

If the dura mater under this crack is not injured, it may poſſibly never

never give any trouble at all; but if it is injured, and inflamed, which is the caſe nine times in ten, the ſcalp covering ſuch fiſſure will, at the end of ſome days, ſwell, and become puffy, and painful to the touch; the pericranium will ſeparate from the ſkull, at the edge of the ſore; and a diſcharge of ſanies, upon preſſure, will ſhew a hollow, or ſinus; upon the diviſion of which, the fiſſure will appear.

However large the fracture may be from which this fiſſure departs, or however freely the trephine may have been applied for that purpoſe, yet the fiſſure muſt not in theſe circumſtances be left to itſelf; for it may be depended upon as a truth, that when the ſcalp and pericranium, are detached, and make ſo diſeaſed an appearance on the outſide, that the dura ma-

ter underneath is in the ſame ſtate, and can be relieved only by perforation: and therefore, that if the application of the inſtrument along the tract of the fiſſure is neglected, the caſe will end ill.

It may not in this place be amiſs to remind the young practitioner, that altho' it is impoſſible for any one, in the caſe of highly-inflam'd, or purulent dura mater, to do well without perforation of the ſkull; yet that operation ſhould be conſidered as only one part of the proceſs neceſſary towards a cure; and that frequent bleeding, gentle evacuation by ſtool, febrifuge medicines, and a low cool regimen, are full as neceſſary after as they were before.

The removal of the piece of bone ſets the inflamed and ſtretched membrane free from part of its preſſure, gives diſcharge to matter, gleet, &c.

but every means, that can ſerve to appeaſe the febrile heat; to leſſen the quantity, and velocity of the fluids; to render the veſſels leſs light, and ſpringy; to empty, and cool the inteſtinal canal; and to procure reſt, and eaſe; are full as much required after the ſkull has been perforated, as before: and this I am rather inclined to mention, becauſe the operation being by many regarded as the laſt remedy, they are apt to be remiſs in the uſe of others, when that has been performed.

SECT. IV.

Of FRACTURES *with Depreſſion.*

FRACTURES without depreſſion differ from fiſſures, only in the diſtance of the broken edges

from each other. When the ſeparation is conſiderable, it is called a fracture; when the bone is merely cracked, ſo as that the parts ſeem hardly ſeparated, it is called a fiſſure; but the chirurgical intention is the ſame in both, viz. to give diſcharge to any extravaſated blood, in preſent; and to provide againſt the formation, or confinement of matter in future.

But in fractures attended with depreſſion, the intentions to be fulfilled are more in number.

In theſe, the depreſſed parts are to be lifted up; and ſuch as are ſo ſeparated as to be incapable of re-union, or of being brought to lie properly, without preſſing on the brain, are to be totally removed.

All

All the circumſtances of commotion, extravaſation, inflammation, ſeparation of the membrane, the formation of ſloughs, or matter; in ſhort, every thing that can attend a ſimple fracture of the cranium, may alſo be found in a depreſſed one: and as all theſe ills are to be obviated, or remedied, in the ſame manner in both caſes; there is no need of repeating it in this place.

To free the brain from preſſure, and to provide a ſufficient opening for the diſcharge of blood, or matter, by elevating the depreſſed, or by removing the looſe pieces of the cranium, was as well known to the antients, to be the proper curative intention in this kind of fracture, as it is to us; but the means they made uſe of, to accompliſh this end, are ſomewhat different from

thoſe which we now uſe, and labour-ed under ſome imperfections, and inconveniences, which the preſent practitioners have corrected.

Most of the attempts made by our anceſtors, for the elevation of depreſſed, or the removal of broken parts, were made by the application of inſtruments to the parts ſo depreſſed. This was a palpable imperfection, to ſay no more of it. But this was not all; for moſt of the inſtruments uſed upon theſe occaſions were of ſuch conſtruction, as to require ſome force in faſtening them to the piece, which they were deſigned to elevate. The terebellæ, the trochlea tripes, the trochlea bipes, and all the pieces of machinery deſigned by Albucaſis, Guido, Andreas a Cruce, Fabritius ab Aquapendente, Pare, and Scultetus, as well as thoſe delineated by Hildanus,

danus, and Paaw, are proofs of this; they all require a perforation to be made in the depreſſed piece, either by, or for, the ſkrew with which it is to be elevated.

Now, not to mention that moſt of theſe inſtruments are ſo complex, as to render them neceſſarily aukward, and unmanageable; it is obvious, that by the application of any of them to the depreſſed, or looſe bone, all the ills ariſing from preſſure made on the brain are liable to be increaſed: beſide which, in ſome kinds of fractures, it is impoſſible to make uſe of any of them; and, in others, if they were uſed, they muſt neceſſarily prove inefficacious.

Celsus has directed the meningophylax to be uſed as an elevator; which inſtrument differs indeed but little either in form, or manner of

application, from the preſent common elevator: but then the opening, by which it is to be introduced, is to be made either with a terebra, or the cycliſcos; the tedioufneſs, and inconveniencies attending which, have already been remarked.

In ſhort, all the objections which were made to the perforating inſtruments uſed in ſimple fractures, being of ſtill greater force, in thoſe accompanied with depreſſion; and the application of any power to the ſurface of a looſe, or depreſſed bone, being manifeſtly attended with ſome degree of hazard; the preſent practitioners are juſtified in laying them all aſide, and endeavouring to accompliſh the ſame end by methods which are leſs operoſe, and more free from danger.

According to the preſent practice, a perforation is made with a trephine

trephine in the ſound, undepreſſed part of the ſkull; either comprehending the edge of the fracture, or ſo near to it, (according to the circumſtances of the caſe) that an elevator may be introduced thro' ſuch perforation, under the looſe, or depreſſed part; which is by that means elevated, or, with the help of a pair of forceps removed, and that without any riſque, either of preſſing on the brain, or wounding the membrane.

What number of perforations may be neceſſary, can be determined only by the particular circumſtances of each individual caſe; all the intentions with regard to extravaſation of blood, or formation of matter, which have been mentioned under the article of ſimple fracture, are to be here fulfilled; with the additional ones, of removing the looſe, or raiſing up the depreſſed piece:

piece: therefore, tho' the caſe may be ſo circumſtanced, that one perforation may prove ſufficient for the two laſt mentioned purpoſes; yet if the fracture be of any length, the inſtrument ſhould certainly be more freely applied, for reaſons which have already been given at large.

The elevation of the depreſt part of the cranium, is ſometimes very eaſily accompliſhed; and ſometimes is attended with a good deal of difficulty. It is ſometimes followed by an immediate remiſſion of the ſymptoms, and ſometimes not; according as the caſe is more or leſs complex.

If the whole diſeaſe conſiſts in the preſſure made by the broken piece of bone; the elevation of that, and the conſequent diſſipation of the ſymptoms, afford good hopes of a cure: but if the injury is not of

ſo ſimple a kind; if other parts are hurt, and other miſchief done, the mere remiſſion of ſuch ſymptoms as proceeded from the preſſure of the fracture, does not by any means give ſo good a proſpect.

The dura mater may be ſo hurt, as to be detached, to inflame, and ſuppurate; or a quantity of lymph, or blood, may be extravaſated, in the ventricles of the brain; or its internal medullary ſtructure may be ſo ſhook, that the merely raiſing up the depreſſed bone, tho' it may remove ſuch ſymptoms as its preſſure occaſioned, will do very little towards producing effectual relief. For the extravaſation of fluid, or the putrefaction of the dura mater, will prove as certainly fatal in the end, as the neglected fracture would have done.

THE combination of different ill effects from the ſame primary violence, and the great difficulty of diſtinguiſhing them from each other, is one principal cauſe of that perplexing anxiety occaſioned by wounds of the head. When one cauſe of bad ſymptoms is removed, another, or even ſeveral, may remain; each of which ſingly may be ſufficient to deſtroy the patient. And therefore, tho' the means made uſe of are extreamly proper, being ſuch as were pointed out by the moſt preſſing ſymptoms, and ſuch as in a ſimple caſe, would moſt probably be effectual; yet in a complicated one, by not being able to anſwer every intention, they frequently anſwer none.

THIS every practitioner ſhould know, and the proper friends of every patient be informed of; leſt

the

the former ſhould promiſe what is not in his power to perform, and the diſappointment of the latter be thereby rendered the more painful.

If the bone is broke, and depreſſed in one part only, the trephine and elevator [r] muſt be applied, in ſuch manner, and ſo often, as to anſwer the purpoſe intended: but if the depreſſed bone is cracked all around, the beſt and ſafeſt method is, to take away the whole of it; that is, all that part which is circumſcribed by the crack; eſpecially if the fracture was produced by a ſmart blow, or much force.

To thoſe who are unuſed to things of this ſort, ſo large an opening, as this muſt ſometimes make,

[r] In moſt caſes, the common elevator is ſufficient for all purpoſes: but there are ſome particular fractures, with ſeveral looſe pieces, in which the elevator of M. Petit, as improved by M. Louis in the Mem. de l'Acad. de Chirurg. will be found a very uſeful inſtrument.

make, will have a tremendous appearance: but it ſhould alſo be conſidered, that however large the portion of the membrane may be, which is by this means uncovered, yet the ſame portion, or perhaps a larger, muſt have inflamed, and become ſloughy, under the fractured piece.

In caſes where the broken piece is ſeparated by a pretty wide fracture, and is looſe all round from the reſt of the ſkull, every body ſees, and acknowledges the propriety of this removal, tho' they do not attend to it when the piece is not looſe: whereas, in truth, the neceſſity is almoſt exactly equal in both caſes. In the former, the piece is taken away, becauſe it is ſo looſened from all connexion, either with the dura mater or the reſt of the ſkull, that its re-attachment is thought

thought impracticable; and it would lie in the way, and hinder the diſcharge from the ſuppurating membrane; in the latter, tho' the piece is not perfectly ſeparated from the reſt of the cranium, yet, in general, all that part of the dura mater, which lies under the piece circumſcribed by the fracture, is ſo injured, and detached, that its reunion with the bone is equally impracticable; and matter will as certainly be formed on its ſurface in one caſe, as in the other, with this very material difference, that the ſuppuration may poſſibly caſt off the looſe piece, but never can the other.

The frequent obſervation of fatal abſceſſes, formed under bones which had been depreſt, and perfectly elevated, joined to the trouble and difficulty which attended the antient manner of raiſing them up, I take

to

to have been the reaſons why our anceſtors do, in general, direct the depreſt part to be taken away.

WHATEVER was their motive, I cannot help thinking, that their conduct was right, and wiſh it was more frequently imitated; for the number of thoſe who die by the preſſure of the broken bone, bears no proportion to that of thoſe who are deſtroyed by the inflammation, and putrefaction of the dura mater.

WITH regard to the operation itſelf, it is impoſſible to give any other than general directions: the manner of applying the inſtrument, the number of perforations it may be neceſſary to make, with many other particulars, can only be determined by the circumſtances of each individual caſe.

THE elevation of parts depreſſed, the removal of ſuch as are totally

diſunited, the free diſcharge of blood in preſent, and of matter in future, are the general intentions which ought to be fulfilled: whatever comes ſhort of theſe, is of no uſe at all, and might full as well have been omitted. And therefore, many of the prohibitions to be found in books, againſt applying the inſtrument upon particular parts, cannot be received as poſitive rules.

These places are the ſutures, the lower and hinder part of the head, the temples, and that part of the frontal bone which covers the ſinuſes.

The reaſon given for not ſetting a trephine on the ſutures is, the fear of hæmorrhage.

When it can, with equal utility, be applied on any other part of the ſkull, the ſutures ſhould certainly be avoided; but if the neceſſity of the caſe requires it, they may be com-

prehended within the perforation, without any hazard at all, as I have ſeveral times experienced. A ſmall flux of blood generally follows, but I never ſaw it give any extraordinary trouble; a bit of dry lint and very moderate preſſure for a few minutes has always reſtrained it: nay, I have been obliged to remove a large fragment of bone, which has been driven thro' the dura mater into the longitudinal ſinus, without having any trouble from the bleeding.

It is not indeed to be wondered at, that the antient practitioners were in general ſo fearful of wounding theſe parts*; the pointed inſtruments which they made uſe of, the little

* This is certainly the caſe of by far the greater number of the antient writers; but even, among theſe, there are ſome who have differed from the general opinion, and adviſed trepaning upon a future, if neceſſary; ſuch are Berengarius Carpenſis, J. Baptiſta Corteſius, and a few others.

little command they had of them, and the apprehenſions they were under, of the conſequence of a hæmorrhage from a ſinus, were ſufficient to deter them; but a better knowledge of the ſtructure of the parts, and the uſe of the trephine, has removed this fear, and convinced us, that, when it becomes neceſſary, a ſuture may be comprehended within the circle of the ſaw, and no miſchief follow[t].

In truth, if this matter be conſidered properly, it will appear, that

[t] In thoſe caſes where a piece of bone was to be taken away, on account of a fracture near to a ſuture, our forefathers went as near to it as they might with ſafety; applying the terebra in a ſtrait line, between the fracture and ſuture, but in a ſemicircular one, on the other ſide of the fracture; as appear from many paſſages, as well as the following:

"Quod ſi rima juxta ſuturam fuerit naturaliter ſe habentem, ſola rima in ambitu perforetur, et excidatur; ad tutam vero terebrationem, rectus ordo foraminum detur inter ſaturam et rimam, deinde alius paulum ſemicircularis, circumſcribens totam fiſſuram."

Oribasius.

in the caſe of bloody extravaſation, or of ſuppurated membrane immediately under a ſuture, the upper part of the ſinus, and the cranium, are ſeldom if ever in contact with each other: in the former caſe, the coagulated blood lies between them; and, in the latter, the inflamed membrane is always detached from the bone; ſo that the hazard, if there really was any, would be confined to the caſe of depreſſed fracture without extravaſation; in which the elevation of the piece of bone becomes neceſſary at all events.

The hinder part of the ſkull may certainly be trepanned as low as the lambdoid ſuture, or even lower if neceſſary. It is true, that the bone is thicker there than in any other part of the cranium, and the operation is more troubleſome; but it is not therefore more hazardous.

The

The reaſon generally given is, the fear of wounding the ſinus's; but a careful operator will be in no great danger of that; to which it may be added, that when this part of the cranium is perforated, it is not done from choice, but from neceſſity; and therefore, when the fracture does not run ſo low, as to render the application of the inſtrument abſolutely impracticable, the trouble which may attend it, or even ſome little additional hazard, are no objects of conſideration.

The temples have been forbid, on account of the muſcles on the outſide, and the veſſels both within and without: but repeated experience has proved, that the temporal muſcle may be divided, and the bone perforated, without either convulſion, or conſiderable hæmorrhage.

It is true, that in that fatal kind of ſpaſm by which the jaw is fixed, and the mouth kept ſhut, this muſcle is much affected; but it is not this muſcle only; many others are made equally rigid; all the muſcles of the ſpine, but particularly thoſe of the neck, being moſt frequently in the ſame ſtate.

Neither is this ſpaſm at all peculiar to wounds of the temporal muſcle; but happens indifferently to thoſe, and to injuries done to many other parts of the body; fractures of the limbs, of the ribs, wounds of the belly and breaſt, &c. in ſhort, I hardly know a tendinous, or membranous part, which, by being wounded and irritated, has not at times produced this generally fatal ſpaſm.

THE reaſon for not trepanning on the frontal ſinus is too obvious to need reciting.

WHEN the depreſt parts are raiſed, the looſe ones taken away, coagulated blood diſcharged, and the brain freed from preſſure, the bare membrane ſhould be dreſſed as lightly and as ſoftly as poſſible.

OUR anceſtors had a multiplicity of medicines, which they made uſe of upon theſe occaſions; and were very preciſe in ſuiting them to the different ſtates, as they called them, of the ſore: they were alſo very exact in making thoſe pieces of linen, or ſarſanet, called ſindons, which they dipped in theſe medicines, and applied upon the ſurface of the membrane, paſſing them alſo under the edges of the perforation.

I HAVE not ſaid any thing of either, becauſe I verily believe the

majority of the former, to be at beſt uſeleſs, and the latter often prejudicial.

If the operation is attended with ſucceſs, that is, if by the diſcharge of extravaſated fluid, or by the elevation of depreſt bone, the ſymptoms diſappear, and no cauſe of miſchief remains; the dura mater readily obeys the motion of the blood thro' the arteries of the brain, and is alternately elevated, and ſubſides; by degrees it loſes its bright ſilver hue, and caſting off a thin ſlough, is covered by a granulation of new fleſh, of firm conſiſtence, and florid colour; this daily diſcharges a moderate quantity of good matter, and riſing gradually till it gets above the edges of the perforation, joins with that which ſprings from the ſurface of the bare cra-

nium, and together with it makes a firm cicatrix.

DURING this whole time, the patient is free from fever, has quiet ſleep, natural appetite, and natural diſcharges; is cool, and tranquil; and in ſhort comes as near to being in health, as ſuch circumſtances will permit [u].

ON the other hand, if the miſchief is ſuch that the means made uſe of prove ineffectual, the appearances, and the event, are generally very different from theſe.

IF

[u] " Salutis notæ ſunt, ulcus non dolens, cerebrique " membrana naturalem colorem ac motum ſervens, ulcus " poſt ſuppurationem imminui, pus album æquale modice " craſſum, et non male olens; ulcus quod initio album " apparuit poſt aliquod tempus rubeſcere, carnem millio " ſimilem producere, ſquamulaſque ſuo tempore emittere, " ſine perturbatione ſomnum capere, ſine febre eſſe, cibum " appetere, aſſumpta digerere, æquas excretiones fieri, " glandulas quæ primis diebus apparuerant, vel eryſipelas " cito diſſolvi. ARCHIGENES de Signis.

" Spem vero certam faciunt; membrana mobilis, ac ſui " coloris, caroin creſcens rubicunda, facilis motus maxillæ, " atque cervicis. CELSUS.

If the commotion is not relieved by the general evacuation, that wild look, and inconſiſtent diſcourſe, that quick and full pulſe, which are its general characteriſticks, do not abate until the patient ſinks into inſenſibility, and dies.

If the caſe was an extravaſation, out of reach, the oppreſſive ſymptoms occaſioned by it remain; the patient, if let alone, would always doze; when not excited takes little or no notice of external objects, or elſe is perfectly ſtupid and inſenſible; has a full, ſlow, labouring pulſe; and generally dies delirious, and convulſed.

In both theſe, the membrane will caſt off its ſlough, and ſeem inclined to incarn; but as the patient grows worſe, that incarnation on the membrane, as well as the ſore of the ſcalp, change, and become

come pale, glaſſy and ſoft; and, inſtead of matter, diſcharges a thin fœtid gleet.

If the dura mater is injured in ſuch manner as to inflame, and become ſloughy, inſtead of being looſe, and eaſily obeying the motion of the brain, as it is called, it becomes tenſe, riſes and preſſes againſt the edges of the perforation, or fracture, and notwithſtanding all that has been ſaid concerning its inſenſibility, is very painful to the touch.

If the feveriſh ſymptoms run very high, it becomes black, and is extreamly offenſive; in which circumſtance, the caſe is generally ſoon terminated *.

If

* "Mala ſigna ſunt membrana immobilis, nigra, vel "livida, vel aliter coloris corrupti, dementia, acris vomitus, "nervorum vel diſtenſio, vel reſolutio, caro livida, maxil- "larum rigor, atque cervicis." Celsus.

If the ſymptoms are not quite ſo violent, but yet the miſchief is of the fatal kind, the membrane caſts off its ſlough, and is covered by an incarnation, which is not kindly, either in colour, or conſiſtence; gleets largely, and thruſts up a fungus, greatly exceeding the limits of the perforation, but lying looſe upon the ſurface of the cranium; which, inſtead of turning brown, as if it tended to exfoliate, puts on a purulent kind of colour; the edges of the ſcalp are looſe, pale, and flabby; the fever continues, without remiſſion; the ſtrength hourly decreaſes; the ſleep is little, and that very much diſturbed; the cheeks are fluſhed, and the reſt of the face yellow; the eyes are ſunk in the orbits, and have loſt their natural brightneſs, and luſtre; the ſkin is dry, and intenſely hot; and

the

the rigors, which at firſt[x] were few, and ſlight, are now ſevere and frequent.

From ſuch circumſtances as theſe, the worſt concluſions are to be drawn; and, to uſe the words of Berengarius, "*Hic caſus eſt de his* "*à quibus non evadunt aliqui niſi* "*nutu dei.*"

SECT. V.

Of Wounds *of the* Meninges *and* Brain.

THE writers of memoirs, and of caſes in ſurgery, ſeem in general to have had it much more in their intention to ſurprize, than to inform their readers; and have choſen to give

x "Si rigor frequens et iteratus, febre non deſinente, "ægrum jam debilem invadat, lethale," is a general aphoriſm of Hippocrates, and is moſt frequently true when conſidered in a general ſenſe; but when applied to the particular caſe of wounds of the head, is invariably ſo.

give us ſuch extraordinary relations in this part of ſurgery, as come more properly under the denomination of miraculous eſcapes, than cures.

If we look into many of them, we ſhall find ſo many inſtances of ſucceſs, where the membranes have been divided, and large portions of the brain diſcharged, that one would almoſt be inclined to believe, that it was a part very little neceſſary to life; and that the hazard conſequent upon its being hurt, had been greatly exaggerated by our anceſtors, did not frequent experience furniſh moſt melancholy proofs of the truth of their doctrine.

I must deſire not to be miſunderſtood, as if I meant to inſinuate that wounds of the brain were neceſſarily fatal: I know from experience that they are not; but I know

know alſo, that the number of thoſe who get well, under theſe circumſtances, is ſo ſmall, compared to that of thoſe which are loſt, that a recovery is little more than poſſible: the knowledge of which may ſerve to put a man upon his guard in prognoſticating, but will not abate his induſtry, or leſſen his attempts to ſerve his patient.

THE meninges, or brain, are wounded either by the inſtrument which breaks or divides the ſkull, or by the edges of the broken bone: the latter generally produces a lacerated wound of the membranes, and bruiſes as well as wounds the brain. Foreign bodies alſo, ſuch as bullets, wadding, ſplinters, parts of weapons, &c. are ſometimes lodged upon, or within it.

BUT let the kind of wound, or fracture, be what it will, or whatever

ever circumſtances may attend the caſe, the chirurgic intention is ſhort and plain; viz. to remove ſuch foreign bodies as can be eaſily got at, and all looſe pieces of the cranium; to free the brain from all preſſure; and to make ſuch an opening, as may ſerve all the purpoſes of the diſcharge either of blood, or matter.

When the ſurgeon has done this, and has taken care of his patient by evacuation, and a general regimen, he has done all that is in his power, and may very truly ſay on this occaſion, what Mr. Pope has juſtly ſaid on another;

Thus far was right; the reſt we leave to heaven.

The dreſſing to the wounded membranes, or to the brain, ſhould be as light and ſoft as poſſible; nothing that may inflame, or irritate, nor

nor ſo applied as to preſs, or confine the neceſſary diſcharges.

Among authors, will be found a great variety of applications for this purpoſe; as preventatives of ſuppuration, as ſuppurants, as detergents, as incarnatives, &c. &c. &c. but whoever confides in any of them will be deceived. Suppuration, and incarnation, are acts of nature, not of art: when the latter has removed all impediments, the former will do her own buſineſs; and the practitioner will find, that ſoft fine lint, laid in lightly, ſo as to abſorb part of the matter, without confining it, will in general anſwer all the purpoſes for which ſuch a farrago of balſams, liniments, and oils have been preſcribed.

SECT. VI.

Of EXTRAVASATION *and* COMMOTION.

THESE have been ſo confounded together, under the general term CONCUSSION, that hardly any diſtinction has been made between them, tho' they differ very eſſentially from each other.

BOTH of them have occaſionally been ſpoken of in the courſe of theſe papers; and therefore I ſhall ſay no more of them here, than what may ſerve to illuſtrate, or explain the former hints.

EXTRAVASATION is either of blood, or lymph; which fluids lie either upon the ſurface of the dura mater, or between it and the pia mater, in the ſubſtance of the brain, or in its ventricles.

WHATEVER the fluid is, or wherever it is ſituated, if it is in ſuch quan-

quantity as to become prejudicial; the ſymptoms it produces are thoſe of preſſure, and are conſtantly, and invariably attended with a greater or leſſer degree of abolition of ſenſe, and motion.

If the extravaſation be of blood, and conſiderable in quantity, it is ſometimes accompanied by a bloody diſcharge from the noſe and ear; if the ſtroke, by which the extravaſation is produced, is near to, or upon a ſuture, the quantity is generally larger, than when the middle of the bone is ſtruck.

Extravasation of lymph, and commotion of the brain, are frequently occaſioned by blows on the head; but they are alſo frequently produced by general ſhocks of the whole frame, in which no external violence is offered to the head in particular.

LYMPHATIC extravaſation is moſt frequently in the ventricles, tho' it is ſometimes between the membranes.

IT is ſometimes produced all at once; but is moſt frequently accumulated gradually.

IF the depoſition is large, and made at once, the ſymptoms are immediate, urgent, and ſimilar to thoſe from blood: if the quantity is ſmall, the ſymptoms are at firſt ſlight, and either diſappear upon proper treatment, or are gradually increaſed until the preſſure becomes fatal.

I HAVE ſeen two very remarkable inſtances of this kind; one was a child about four years old, who fell off from a bed upon a ſoft carpet; the other was an adult, who ſlipped from an height not exceeding five feet, and fell upon her breech: in both, the extravaſations were of the limpid

limpid kind, and in the ventricles of the brain; they were both well ſeveral days after the accident, and their firſt complaint was a drowſineſs; after which the ſymptoms of preſſure hourly increaſed, until they became inſenſible, and died paralytick.

Large extravaſations of blood, and depreſſion of the cranium, are produced at the inſtant of the blow; and their ſymptoms therefore appear immediately: effuſion of lymph, and detachment of the dura mater, tho' really the effect of the blow as much as the former, yet do not ſhew themſelves by their ſymptoms until ſome days are paſt. Therefore, tho' the immediate appearance of bad ſymptoms does certainly indicate preſent miſchief; yet the abſence of them, for ſome days, does

by no means imply ſafety: a caution never to be forgot.

Of commotion of the ſolid parts of the brain, we have only a negative kind of proof.

Very alarming ſymptoms, followed by the moſt fatal conſequences, have ſometimes been found to attend blows, falls, ſhakes, &c. and, upon the ſtricteſt examination, neither fiſſure, fracture, wound, nor extravaſation of any kind, has been diſcovered. This is ſtrictly and properly concuſſion; and tho' we have no proof what the immediate and preciſe effect of this ſhock is upon the brain, yet there can be no doubt but that ſome diſorder is produced in that part of it from whence the nerves have their origin, or with which they have an immediate connexion. All the ſymptoms, while the diſeaſe is recent, and many of the

the evils which follow ſuch a concuſſion, and which ſometimes remain during the reſt of the patient's life, are proofs of this.

The ſymptoms are proportioned to the degree of violence offered to the brain; and, when not accompanied by extravaſation, are not of the oppreſſive kind; a wildneſs and inconſiſtency of look and diſcourſe; a frequent and hard pulſe; ſome degree of fever; vertigo, vomiting, and obſtinate watching, frequently attend it at firſt; debility of underſtanding, a deſipient or idiot countenance, failure of memory, paralyſis of one part, or one limb; loſs of one ſenſe, or of the ſight of one eye; ſpaſm, contraction, or rigidity of one particular part, or muſcle, are ſometimes the conſequence.

Some of theſe are ſometimes cured, others remain incurable; and it may not be improper to remark, that there is not one among them, that has not been ſeen to attend a commotion produced by a general ſhock of the whole frame, in which the head ſuſtained no particular violence; that is, none ab externo [y].

If the concuſſion is very violent, all ſenſe and power of motion are immediately deſtroyed, and death is the [z] conſequence: but between this, and that ſlight degree of confuſion

[y] An intimate friend of mine, by a fall on his breech, became immediately wild and inconſiſtent, talked idly, or rather raved, for ſeveral days, and never ſlept for as many nights: by means of a low diet, and very free evacuation by bleeding, he at laſt got well, but with the loſs of one of his ſenſations. In this caſe, I always obſerved, tho' it was neceſſary to give him cathartic medicines, he being of a coſtive habit, that they always quickned his pulſe, and added to his inquietude for ſome hours; but bleeding always ſenſibly relieved him.

[z] "Quibus conquaſſatum eſt cerebrum continuo neque "vident, neque audiunt, ac fere moriuntur."

Hippocrat.

fuſion which ſometimes attends a concuſſion, there are many ſtages.

MERE commotion, unaccompanied with extravaſation, or other evil, requires free evacuation by phlebotomy, a low diet, and extream quietneſs.

EXTRAVASATION of any kind, and wherever ſituated, is dangerous; a very ſmall quantity will ſometimes bring on the moſt threatning ſymptoms, and endanger life.

OF all the kinds, that of blood ſituated between the ſkull and dura mater, is the moſt likely to be relieved; next to that is the ſame fluid between the dura and the pia mater; thoſe which lye deeper, whether of blood or lymph, are attended with the greateſt hazard.

WHEN the extravaſation is attended with no external mark of violence, there is no rule whereby to judge

judge of its ſituation; no direction where to remove the ſcalp, or perforate the cranium, in ſearch of it; and conſequently, no authority for doing either. In this caſe, our only hope is from phlebotomy. The intention by this, is to leſſen the quantity circulating thro' the general ſyſtem of veſſels, ſo as to aſſiſt nature in the abſorption, or diſſipation of what is ſhed, and thereby take off the preſſure it makes on the brain, and nerves.

This effect is not to be expected from the loſs of a few ounces; the operation muſt be frequently repeated, at ſhort intervals, and from different parts, according to the ſtrength of the patient, and the urgency of the ſymptoms.

By this means very alarming ſymptoms have been removed, and perſons in very hazardous circumſtances recovered.

recovered. This is one of thoſe caſes, in which a ſurgeon muſt not ſuffer himſelf to be influenced by the fears of friends and by-ſtanders; but muſt act according to his judgment and the exigence of the caſe: large and repeated bleedings terrify the ignorant; but, in theſe circumſtances, we have no other remedy.

But when extravaſation is the conſequence of ſuch external violence, as leaves an apparent mark where it was inflicted; when the ſcalp is thereby bruiſed, cut or torn; then we have an indication, and an authority for doing ſomething more. For if the extravaſation is the immediate conſequence of the ſtroke on the ſkull, and the depoſition is made immediately under, or very near to the place ſtruck, the removal of a piece of bone from that

part, may be of great benefit; and the bruiſe or wound of the ſcalp, is our director where to make ſuch attempt.

Not that ſuch external mark is to be deemed infallible; extravaſated blood is often found at great diſtance from it, and may be cauſed from the general concuſſion of the head, not by the blow; in which caſe, it is found in the ſubſtance of the brain, or in the ventricles, quite out of the reach of our aſſiſtance.

These are caſes in which we are not to expect certainty, but muſt be content with ſuch information as we can get; and as our opportunities of being ſerviceable are too few, we ſhould let none ſlip, but embrace even poſſibilities. The general maxim, laid down by Fab. ab Aquapendente, is extreamly applicable

plicable to the preſent purpoſe[a]; and therefore if the ſymptoms are urgent, and do not remit upon plentiful bleeding, the wounded, or bruiſed part of the ſcalp ſhould be immediately removed, and the chance of relief from perforation of the cranium be embraced.

If the quantity of blood is ſmall, and lies between the dura mater and cranium, immediately under the perforation, it may poſſibly be thereby diſcharged, and the ſymptoms may immediately diſappear.

When this is the caſe, it is certainly a full vindication of the operation, whether the event is lucky, or not; for it is very neceſſary, that thoſe who are not well acquainted with theſe things ſhould know, that tho'

[a] "In vulneribus quæ ſua natura admodum ſunt periculoſa, peſſimum eſt expectare prava ſymptomata, et tunc demum providere, cum forſitan occaſio præteriit, nec amplius providere licet."

tho' the firſt ſymptoms may be only thoſe produced from the preſſure of the extravaſated blood; yet the diſappearance of theſe ſymptoms does not, by any means, enſure a cure.

The extravaſation of that fluid, may be all the miſchief produced by the accident; it may be ſo ſmall in quantity, as to ſeparate a very ſmall part of the dura mater from the inſide of the cranium; and the neceſſary evacuations, joined to the operation of the trephine, may prevent any farther miſchief.

But, on the other hand, the quantity may be ſo large, or ſo diſperſed, as to cauſe a large detachment of the membrane; or the ſtroke may have been ſo ſmart, as to injure, and inflame it; in both which caſes, much, and even fatal miſchief may follow, notwithſtanding the firſt ſymptoms are taken off. The com-

plaints

plaints produced by preſſure, and thoſe which ariſe from inflammation, and ſuppuration of the dura mater, are very diſtinct; the firſt may be relieved, or even totally removed, together with its cauſe; and the latter, in due time, produce its fatal effects, notwithſtanding all that has been, or indeed, in many caſes, can be done.

Of this every practitioner ſhould be aware, leſt he both expect and promiſe too much. The complication of different kinds of miſchief, from the ſame cauſe, ſhould always be in his mind; and his prognoſtic ſhould always be made accordingly.

In perforating thoſe parts of the ſkull where the diploe is thickeſt, it will ſometimes bleed very freely; and ſometimes the ſeparation of the piece included in the inſtrument, from

from the dura mater, will be followed by a ſmall flux of blood; but from neither of theſe is the operator to expect relief: this is blood in a natural fluid ſtate, and previous to the operation was circulating thro' its proper veſſels; whereas that, whoſe preſſure produces the ſymptoms, is out of the circulation, is always in a coagulated ſtate; and it is the diſſipation, or diſcharge of this only, which can bring relief.

The nearer the extravaſation is to the ſkull, the better; conſequently, that which is between it and the outer ſurface of the dura mater is the beſt; the deeper it is, the more hazardous, not only as it preſſes more immediately on the brain, and nerves, but as it cannot be got at, nor can any attempt be made for its diſcharge, but by the diviſion of parts of great conſequence.

If

If the coagulated blood lies under the dura mater, between it and the pia mater, and the ſymptoms are urgent, the former of theſe muſt be divided: for there being no natural outlet, whereby it can be diſcharged; and the ſymptoms being ſo preſſing, as not to afford time to wait the probability of its diſſipation, the diviſion of the membrane becomes the unicum remedium.

I have often ſeen it done, and have ſometimes done it my ſelf; the ſucceſs, which has now and then attended it, has been ſufficient to ſatisfy me of the propriety of it, when the ſymptoms are very urgent, and the appearances ſuch as render it moſt probable that the extravaſation is near to, or under that part of the membrane which is made bare by the perforation; but I muſt

again repeat, that it does not appear to me to be a matter of ſo much indifference, as it is by ſome ſaid to be.

Wounds of the membranes of the brain, by whatever body, or in whatever manner inflicted, have always been regarded as hazardous; and, which is more to the purpoſe, have always been found ſo: it is indeed in ſome meaſure true, that a ſimple diviſion of them, by a cutting inſtrument, is leſs dangerous than a wound made by a piece of bone, or any rough body, which tears, or bruiſes; yet this relates only to the manner of the diviſion; the parts divided are the ſame in both, and the external air is equally let in upon the brain immediately, or upon a membrane of ſo delicate ſtructure, that it is next to impoſſible that it ſhould not ſlough, and leave the brain bare, which in theſe caſes

caſes generally thruſts up a large ill-natured fungus; a very unpleaſant circumſtance to the ſurgeon, and no advantageous one to the patient.

Some few writers have indeed affected to talk very freely of making inciſions thro' the membranes into the brain, in ſearch of extravaſated blood, or matter, which may be ſuppoſed to be there.

They obſerve, with a kind of ſneer, that the preſent practitioners ſeem as fearful of dividing the brain, as the antients were of the meninges, tho' both may be done with great ſecurity.

For my own part, I cannot help thinking (and that from experience) that the apprehenſions of both are far from groundleſs; and tho' neceſſity, in the caſe already mentioned, will fully vindicate the diviſion of the dura mater, for the diſcharge

of an extravaſated fluid, yet a random inciſion into the brain is by no means warrantable.

I WOULD not be thought to encourage timidity, or add to the fears of a practitioner; and, when there is a probability of ſucceſs, would go perhaps as far as any one who can give ſome kind of reaſon for what he does: but ſtill I cannot help thinking that caution, and fear, are very different things; and that, when there is no reaſonable proſpect of doing ſome good, there is no authority for doing any thing.

THE very ingenious Haller has taken a great deal of pains himſelf, and has put a number of animals to a great deal more, to prove that the meninges are neither ſenſible, nor irritable; but whether this is ſtrictly true, or not, it is plain, from the ſame gentleman's experiments,

that

that they are the immediate covering to one of the moſt ſenſible, and moſt irritable parts of the animal: and we all know, from dire experience, that inflammations, and wounds of them, are ſo far from being matters of indifference, that they moſt frequently end fatally.

I HAVE already taken notice, that all the diſeaſes hitherto mentioned, viz. wound, contuſion, and fracture of the cranium; detachment, and inflammation of the dura mater; the effects of contuſion, &c. may all be joined to an extravaſation, and meet in the ſame caſe: when this happens, the difficulty of judging, as well as of acting, is much increaſed.

THE circumſtance of fracture makes indeed but little alteration in

the caſe of extravaſation; for if the blood lies upon the ſurface of the dura mater, and the fracture is tolerably open, it may poſſibly be diſcharged thereby; but if the fracture is ſmall, or depreſt, the continuance of the ſymptoms will indicate perforation, and elevation; after which, the treatment of both caſes are nearly alike.

In one ſenſe, a fracture may be ſaid to be an advantage; for by making the application of the trephine immediately neceſſary, a diſcharge will be given to what might otherwiſe have been concealed, and done irreparable miſchief.

FINIS.